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THE
KATIGEN COLOURS
OF THE
FARBENFABRIKEN

VORM,

FRIEDR. BAYER & CO., ELBERFELD,

AND THEIR APPLICATION IN THE VARIOUS BRANCHES OF
THE TEXTILE INDUSTRIES.

FARBENFABRIKEN OF ELBERFELD CO.
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Preface.

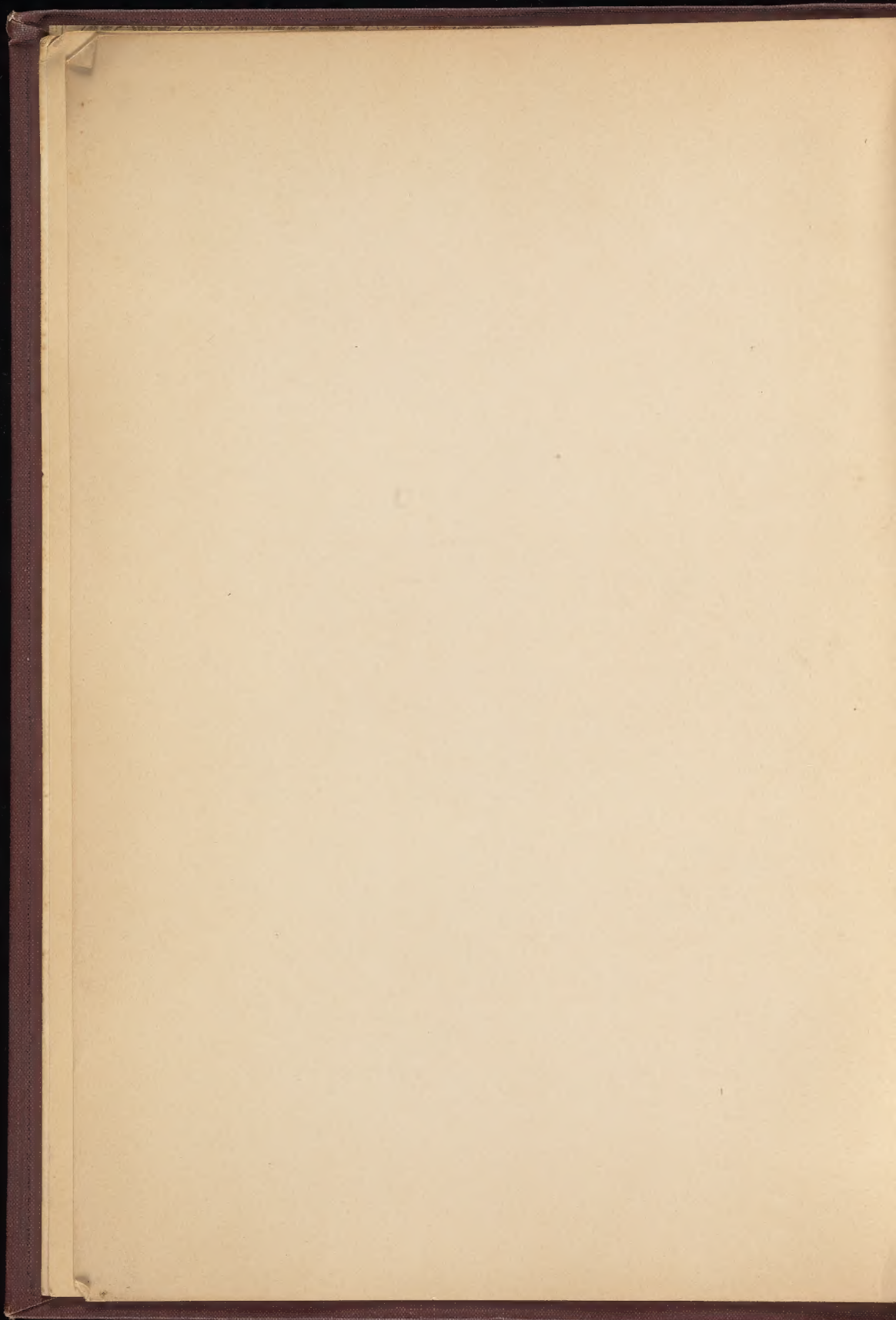
When in the year 1896 "Katigen Black Brown", which after Cachou de Laval is the oldest sulphide colour on the market, was first brought out there was little anticipation at the time that this class of dyestuffs would in such a comparatively short time gain so much prominence in the world of dyeing, but it is now beyond doubt that the "sulphide or sulphur colours", to which category our KATIGEN DYESTUFFS belong, are the dyestuffs of the future for various branches of the textile industries. The simplicity of their application, their extraordinary fastness and excellent properties as well as their comparative cheapness must secure for them great popularity and guarantee a continued use of this group of colours.

We have therefore been constantly on the alert for the discovery of products to complete the range of these dyestuffs, and we are now in a position to place before our esteemed circle of friends the most complete series of sulphide colours on the market, not only as regards variety of shades but beauty of tone and fastness.

In this pamphlet we have attached particular value to the practical experience gathered by many of our friends, and we hope that this first compilation, in which we cover the whole ground and scope of the adaptability of our Katigen Colours, will afford you many an advantageous hint and impart new ideas worth knowing to practical dyers and help to establish our products on a still firmer footing than hitherto.

By the insertion of a great number of patterns, many of which have been prepared by regular customers of ours, we have endeavoured to illustrate the manifold adaptability of our Katigen colours and show the success already attained and the leading position they now hold in the Dyeing of Fast shades on Cotton.

Elberfeld, Autumn 1902.



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Part I.

Katigen Colours and their Application.



Part I.

General Remarks.

1. Properties, and Storing of Katigen Colours.

All the more important products employed in the dyeing of fast shades on Cotton (viz. Aniline Oxidation Black, Alizarine Colours, Indigo, etc.) are combined with a more or less complicated dye method, whereas Katigen Colours as direct dyeing sulphide colours, apart from being equal in fastness to Alizarines are dyed in the same simple manner as substantive colours, which advantages, conjoined with the large variety of shades obtainable, open for the dyer of fast shades on cotton a new field of enterprise.

As already mentioned the Katigen Colours are substantive dyestuffs i. e. with the addition of ordinary and cheap mordants they dye the cotton fibre without any previous treatment, but in many instances a short after-treatment renders the colours much faster, and the dyer can safely guarantee a good resistance of the shades, immaterial what application they are subjected to afterwards. This is naturally of much importance especially to dyers to the trade as generally only vague information is ascertained or imparted as to the subsequent treatment the goods may be subjected to or the fastness required. Katigen Colours are exceedingly fast to light, washing and boiling, and they are furthermore fast to perspiration and cross-dyeing, in fact the only additional property that could be desired is fastness to chlorine, which, however, is of less importance in dyeing than in printing.

Storing. Katigen dyestuffs from their process of manufacture contain inorganic sulphur compounds and alkalies, which of course implies that they must not come into contact with acids, as the sulphide of hydrogen resulting from same is injurious to health, and also affects polished metals, particularly copper, brass and lead, turning same black. Katigen Colours should be stored in a dry room, to which there is no access of steam, as the latter would deteriorate the quality of the product.

Care should be taken that the water used for rinsing the dyed goods does not come into contact with acid or acid chemicals, such as alum, tannin, etc.

2. Solubility of Katigen Colours and the method of dissolving same.

As easy solubility is of main importance in many branches of dyeing, more particularly in machine dyeing, and a perfect solubility ensures level shades fast to rubbing, we append a table showing the solubility of the various Katigen colours and the effect and importance of the respective proportions of sulphide of soda. We would mention, however, that the figures, stated are merely to be considered approximate, as no fixed scale can be given, the percentages being liable to fluctuation.

The following quantities are to be understood as soluble in 1 gallon boiling water:

	Colour alone: about	With the addition of an equal amount of sulphide of soda (cryst.): about
Katigen Black SW	— lbs. $6\frac{1}{2}$ oz.	2 lbs. — oz.
Katigen Black TG	— " 4 "	2 " — "
Katigen Black 2B	— " 2 "	2 " — "
Katigen Blue Black 4B	— " 1 "	1 " — "
Katigen Blue Black B	— " 2 "	2 " — "
Katigen Blue Black R	— " 2 "	2 " — "
Katigen Black Brown N	4 " — "	3 " — "
Katigen Brown V extra	4 " — "	2 " — "
Katigen Yellow Brown GG	— " $12\frac{1}{2}$ "	$2\frac{1}{2}$ " — "
Katigen Chrome Brown 5G	$5\frac{1}{2}$ " — "	$2\frac{1}{2}$ " — "
Katigen Green 2B	— " 14 "	— " 8 "
Katigen Chrome Blue 5G	— " $4\frac{3}{4}$ "	— " $6\frac{1}{2}$ "
Katigen Indigo B extra	— " 2 "	— " 3 "
Katigen Indigo R extra	— " — "	— " 8 "
Katigen Chrome Blue 2R	— " $12\frac{1}{2}$ "	2 " — "
Katigen Olive G	— " 3 "	— " $4\frac{3}{4}$ "
Katigen Olive GN	— " 16 "	" 11 "

You will therefore see from the above table that in some instances it is absolutely necessary to employ sulphide of soda in dissolving the colour, whereas for those colours that are easily dissolved in water an addition of sulphide of soda causes them to be thrown out of solution, consequently the Katigen Black brands require a larger amount of sulphide of soda for dyeing, whilst for Katigen Black Brown N, Katigen Green 2B etc. only a small percentage of this salt is necessary, thereby enhancing the brightness of shade. Further particulars upon this will be found under the different recipes given for each pattern.

Reference is made to the greater solubility of Katigen colours by the addition of glucose, syrup, etc. in the chapter on machine dyeing.

The above particulars refer to the dissolving of colour with soft water, which unfortunately is not always to be had, but it should be remembered that hard water causes the colour to precipitate, the resulting shade being of a bronzy hue; the water must therefore be softened, before the colour is

added by boiling it with soda, soap, etc. For medium and dark shades the colour is best used to advantage in a standing bath, in which case the liquor only has to be softened when preparing the first bath, but for machine dyeing, where even the slightest particle of undissolved matter may have a serious effect only condensed water should be employed.

In dissolving Katigen colours it must especially be borne in mind, that as regards solubility and affinity to the fibre many of them yield the best results when they are properly acted upon by sulphide of soda, and the more concentrated the sulphide of soda solution the quicker it acts upon the colour. It is therefore advisable to dissolve the colour and sulphide of soda together, according to the solubility of the respective colour, in 10—20 times the amount of boiling water before adding same to the dye bath. This is especially to be observed when dyeing light shades, as owing to the comparatively larger volume of dye liquor the quantity of sulphide of soda added to the bath itself would not be sufficient to dissolve the colour entirely, whereas an excess of sulphide of soda would greatly affect the affinity of the colour for the fibre.

3. The preparing of the dye baths.

Katigen dyestuffs as a rule have not so great affinity for the cotton fibre as the Benzidine colours, i. e. a considerable quantity of dyestuff remains in the dye liquor, and under the same conditions the colour is used more to advantage in a short dye liquor.

In order to obtain the same results as shown in the patterns attached the volume of dye liquor for Katigen colours should be 17—20:1 of goods for yarn dyeing in the ordinary vat. Glauber's or common salt is employed to fix the colour on the fibre, the same as for the Benzidine colours, and for your guidance we would mention that:

100 parts Glauber's salt crystals = 50 parts Glauber's salt calcined or
45—50 parts common salt.

Glauber's salt being generally preferred to common salt. Great care, however, should be taken in dissolving the colour and sulphide of soda, and we would recommend that the dye bath, containing the dissolved colour etc., be boiled up for a short time before adding the salt. In working several lots one after another as in machine dyeing not so much care can be given to the dissolving of the colour before adding it to the dye liquor, therefore it is advisable in such cases to pour the colour through a sieve. After a short boiling add the requisite quantity of salt to the liquor and then, particularly with Black and Blue Katigen colours, boil up again sharply for 8—10 mins., as otherwise the dye liquor will not be clear enough.

4. Dyeing and the necessary arrangements for same.

As already mentioned the volume of dye liquor greatly affects the depth of the shade, and in order to keep the proper ratio of dye liquor it is advisable in most cases to employ indirect steam; especially when dyeing in the vat the steam coil should be so attached, that the boiling of the liquor is maintained at a uniform degree the whole time.

All fittings, conducting pipes, taps, etc. and the dye vessel itself should not be made of copper, as this metal is easily affected by the action of the ingredients employed and easily corrodes; it is more advisable to use wooden or iron vessels. For cop dyeing perforated nickel spindles are used.

One of the many advantages of the Katigen Colours lies in their simple dye method, as with some of these colours it is not always necessary to dye the goods immersed in the liquor, but should absolutely level results be required we recommend the use of bent pipes, especially for yarns.

When dyeing yarn in the beck the steam should be turned off before entering the yarn and work it about 5 turns; afterwards it is quite sufficient if each stick-full be turned every 5—8 mins., and unless the temperature of the dyebath drop below 175° Faht. there is no necessity for a further access of steam. The goods are dyed in $\frac{3}{4}$ to 1 hour.

The fact that the shade of most Katigen Colours in solution is different from that on the fibre, — even when not after-treated, — proves that an oxidation in the atmosphere takes place already during the dye process.

This peculiarity is especially noticeable and has to be taken into account when dyeing very deep shades such as blacks and blues, as the yarn above the surface of the dye liquor does not come into contact with the reducing sulphide of soda dye liquor for a comparatively long time. It is therefore advisable to employ a dye vessel corresponding in size with the length of the hanks, so that only an inch or so of the yarn is above the surface of the liquor; care should also be taken that the hanks are not packed too closely and that they do not touch the bottom of the dye vessel.

When dyeing in machines or on the jig, whereby the temperature of the dye liquor decreases much more quickly than when dyeing in ordinary dye vessels it is advisable to keep the liquor simmering during the whole of the dye process.

Dyeing Cold. When properly dissolved the affinity of a large number of Katigen Colours to the cotton fibre, especially mercerised cotton, at the ordinary temperature, has already been made use of by practical dyers. Apart from the saving of steam this method of dyeing Katigen Colours has also the advantage, that when working on the jig reddish shades and lists are avoided; however, the colour does not penetrate the pieces so thoroughly when dyeing in this manner, and it is better to raise the temperature of the bath slightly. Further particulars will be found in Part VI.

Dyeing in the vat. A peculiar method of dyeing, which is especially applicable to piece goods in the continuous dye vessel consists of reducing certain Katigen Colours (especially Blues and Blue Blacks) in the vat with

zinc powder and caustic soda, hydrosulphite solution, sulphide of soda and glucose to an amber coloured liquor, the appearance of which, as well as its behaviour, corresponds exactly with that of the Indigo vat, for which reason Indigo can be employed in combination with same, thereby reducing the cost of dyeing. For further particulars we refer you to Part VI.

5. Rinsing.

When the goods are lifted out of the dye bath they contain a quantity of dye liquor, which in most cases is very concentrated, and must be wrung out of the hanks as much as possible; the simplest way for yarns is to wring out with two sticks, or to run the yarn through a wringer attached to the dye bath. This refers also to warps as well as pieces dyed on the jig, as in both cases the goods must be wrung out before entering the rinsing bath. Loose cotton or cheeses can be hydro-extracted. The extraction of the superfluous dye liquor from yarns and piece goods has the further advantage of preventing the superficial fixation of surplus dyestuff on the fibre, which lies but mechanically on the goods and causes bronzy patches, red lists, etc.

It is also essential that the goods be entered into the rinsing bath as soon as they have been wrung out, so as to prevent any superfluous colour that may still be on the fibre from oxidising by coming into contact with the atmosphere, and the goods should be rinsed until the rinsing water is no longer coloured.

It will also be found useful to rinse the goods first in a special bath at 100° Fahr. containing a slight addition of sulphide of soda, as all colour which is not fixed can in this way be retained, and it ensures more even results on the yarn and pieces. It has also another advantage, that when this first rinsing bath has been employed 5 or 6 times it can be used for replenishing the dye bath itself, or for dissolving colour.

6. Standing Baths.

As already mentioned a good deal of the Katigen colour employed in dyeing is not exhausted, especially when dyeing medium or dark shades, and therefore the actual value of the colour is realised only when working in standing baths. It has been ascertained from bulk tests that for deep shades only $\frac{3}{4}$ to $\frac{1}{2}$ the quantity of colour employed for the first bath are required for standing baths, when working properly. For standing baths only about $\frac{1}{3}$ the quantity of sulphide of soda employed for the first bath is required. The subsequent addition of salt, which in contradistinction to the dyestuff and sulphide of soda has in no way decreased in the dye process, is calculated in accordance with the quantity of water lost in lifting the goods e. g. for every 100 lbs. of yarn 20 gallons of dye liquor have been removed from the bath, now taking a volume of dye liquor of 20:1 of goods

and the addition of salt to the first bath as being 60%, for a standing bath only one tenth that quantity is required viz. 6 lbs. In fact the addition of salt in dyeing certain colours may be entirely omitted when the dye liquor is rather concentrated, as inorganic salts are contained in some colours and increase during the dye process and are quite sufficient in such circumstances to work as a mordant.

The above remarks as regards the addition of salt to be made to the dye baths equally apply to the addition of soda, but as in most cases a part of the soda is used up in saponifying the oil or fat contained in the yarn, it is not advisable to reduce the quantity of soda below 1—2%.

Theoretically speaking the percentages of colour and other ingredients necessary for replenishing the second bath should also be taken for standing baths, yet in reality, according to circumstances, more even results are obtained by arriving at the quantities to be employed for standing baths by gradually reducing the percentages for the third and fourth baths and to consider the percentages then arrived at as holding good for standing baths. Further particulars on this will be found under the various headings of the different colours.

When treating these standing baths with due care, and attention being paid that the goods are entered in not too dirty a condition, they can be preserved for a whole year or even longer.

7. The method of after-treating the goods.

Most of the Katigen Colours, with but few exceptions, do not require any after-treatment, the direct dyed shades being already possessed of all their valuable properties, and in most cases an after-treatment has merely the advantage of improving the shade. At the end of this chapter the characteristics of the different dyestuffs are enumerated and we also give a list of those products which require an after-treatment or which are improved by same.

A. After-treatment by oxidation with air (Steaming).

Many Katigen Colours are already sufficiently oxidised by coming into contact with the oxygen of the air during the dyeing process, e. g. in dyeing warps and pieces or also whilst the dyed goods are left to dry, but in some cases the action of the atmosphere must be made more intense by running the goods at a higher temperature and admitting an abundant supply of oxygen i. e. by steaming; this can be best done in closed vessels whereby the heat is retained as much as possible, and in which the goods can be acted upon by an injector, which constantly supplies a current of air. The oxidising is completed in $\frac{1}{2}$ —1 hour.

Some colours of this category treated in this manner require to be acted upon simultaneously with strong alkalies in order to ensure even and quicker development, others on the other hand yield better results when subjected, directly after dyeing or rinsing, to the action of a hot damp current of air,

and the goods must also be rinsed after they have been subjected to this after-treatment.

B. After-treatment with metallic salts.

As regards cost of dyeing, security of good results and simplicity of working, the after-treatment with metallic salts is generally more advantageous than the more or less thorough oxidation by the action of the atmosphere. The after-treatment with metallic salts is done directly after the dyed goods have been treated in the last rinsing bath. It should not be overlooked to rinse the goods thoroughly, as when working according to the above method any alkalis, such as soda, sulphide of soda, left in the goods destroy the metallic salts rendering them ineffective; it is therefore advisable to rinse the goods thoroughly after dyeing and to add some acetic acid to the bath in which they are after-treated.

Directions for working: First add the acetic acid to the bath in which the goods are afterwards treated, then add the dissolved metallic salts, boil up gently and when steam has been turned off work for 20—25 mins. in this bath. In some cases it will be found beneficial to run the goods first through a warm bath containing acetic acid and $\frac{1}{2}\%$ bichrome, and then to add the other ingredients used for after-treating. Mineral acids instead of acetic acid should in all cases be strictly avoided.

The following metallic salts or combinations of same have given satisfaction in after-treating Katigen Colours:

- | | |
|----------------------------------|------------------------------|
| 1. Bichrome, | 4. Copper sulphate and alum, |
| 2. Bichrome and alum, | 5. Fluoride of chrome, |
| 3. Bichrome and copper sulphate, | 6. sulphate of zinc. |

Further particulars concerning the after-treatment in machines will be found in the respective paragraphs.

When the goods have been after-treated rinse thoroughly again, and finally run through a bath containing a slight amount of soda or ammonia. The reason for so doing is given in the paragraph on "The stability of the fibre when dyed with Katigen Colours".

8. Brightening, Lustring and Weighting.

The dyed shades of Katigen Colours have great affinity for Basic Colours, so that the latter can be employed for shading and brightening purposes. Sufficiently even shades can be obtained on small batches of goods by working the Basic Colours in a bath containing acetic acid or alum; it is advisable, however, when possible to top in a warm soap bath. The brightening should not go beyond the ordinary limits, otherwise the fastness to washing and light is affected.

The fastness to washing is but little impaired and the fastness to light but imperceptibly affected when topped with at the most 0.1% Basic Colours for medium and dark shades. The resistance to light of Basic Colours on

a Katigen bottom shade is considerably better than when dyed on a tannic acid and tartar emetic mordant.

With respect to toning or brightening of Katigen Colours with Benzidine Colours we refer you to the paragraph on "Fashionable and Khaki shades obtained with Katigen Colours".

According to the quality of the yarn and the subsequent application it will be subjected to, most dyers to the trade as a rule have to see that their dyed goods have a certain handle. The following directions, which can be altered to circumstances, will be found useful:

1. $2\frac{0}{0}$ Turkey Red Oil (of the weight of the goods),
 $\frac{1}{2}\frac{0}{0}$ liquid ammonia.

Work for $\frac{1}{4}$ hour luke warm, wring out and dry. This softening can be applied in cases where the yarn has assumed a hard handle by the after-treatment with metallic salts or has got a light bronzy hue.

2. The following is also employed for the same purpose:

- 1— $2\frac{0}{0}$ Olive oil,
 $\frac{1}{4}\frac{0}{0}$ soda ash.

3. To produce a slight scroop, especially on fine yarns, the following can be employed to advantage:

- $2\frac{0}{0}$ glue,
 $2\frac{0}{0}$ paraffine oil,
 $1\frac{0}{0}$ starch.

Volume of liquor 20:1 of goods and the temperature of this bath should be $105-125^{\circ}$ Faht. and the goods treated in same for $\frac{1}{4}$ hour.

Stir up the starch well in cold water and pour same into boiling water, which is then added to the bath together with the glue solution, and afterwards add the paraffine oil during constant stirring. The yarn should of course not be rinsed after the above treatment, but wrung out well and dried at once.

The methods of scrooping mercerised yarns are given in the paragraph on "Katigen Colours on Mercerised Yarns".

Most goods lose in weight by the continued working in the strong alkaline dye bath, but this can be remedied by subjecting the goods to well known weighting methods, whereby an increase of weight up to $15\frac{0}{0}$ can be produced without the shade or handle being in any way affected.

9. The stability of the fibre when dyed with the Katigen Colours.

The results of the extensive scientific and practical tests made to ascertain how far the strength of the fibre is affected by Katigen Colours dyed according to the different methods and subjected to the various after-treatments, are herewith appended.

1. Goods dyed with Katigen Colours, have in no instance deteriorated, when stored, but on the contrary the fibre was improved in strength by dyeing in the strong alkaline bath.

2. When after-treated according to the directions given by us the fibre likewise is not deteriorated.

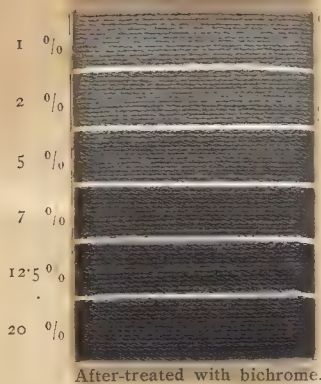
3. When dyeing Katigen Colours on warps, that are subsequently cross-dyed they must be rinsed well after the acid after-treatment, and then treated for a short time in a weak solution of either ammonia or soda.

4. For half-woollen cross-dyed goods containing Katigen dyed warps, as well as cotton pieces dyed with Katigen Colours and after-treated with metallic salts, especially when such goods are to be subjected to a severe steaming, it is advisable to after-treat them in a slightly alkaline solution.

For the weak alkaline solutions employ about $\frac{1}{2}$ oz. soda or borax per gallon water or 1—1 $\frac{1}{4}$ pints liquid ammonia per 100 gallons: Half-woollen goods are treated cold whereas it is better to treat cotton goods in a luke warm bath, which can be done simultaneously with the brightening.

We would mention that this after-treatment in a slightly alkaline bath is more for security's sake than an absolute necessity; if the half-woollen goods are rinsed well after they leave the acid cross dyeing bath and if the cotton pieces, that are afterwards treated with metallic salts are not excessively steamed (say not above 21 lbs. pressure for 2—3 mins.) the cotton fibre will not be affected to any extent and no tendering of the fibre has up to the present been detected.

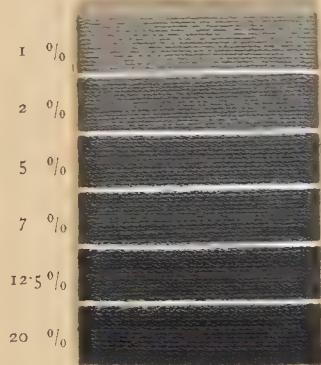
10. Particulars of all Katigen Colours.



After-treated with bichrome.

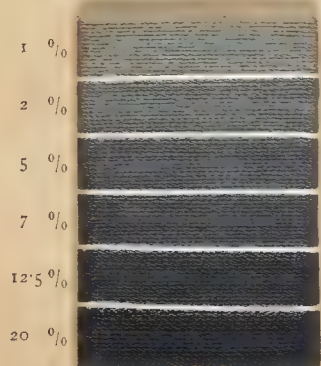
mostly employed in combination with Katigen Green 2 B or Katigen Olive GN.) It is also extensively used in the linen and half-linen industries.

Katigen Black SW. Dyed direct it produces a full, deep black, which when after-treated yields a slightly bluish black shade. Owing to its good level dyeing properties and its excellent fastness it meets with general employment as a substitute for Aniline Oxidation Black where especial fastness to boiling, perspiration, light and cross-dyeing are demanded. It is equally well employed, dyed direct or after-treated, for fancy woven goods and warps, as well as for pieces, velveteens, eskimoos, loose cotton, cops, cheeses, etc. It is also adapted for the dyeing of mercerised cotton hanks; (on pieces it is



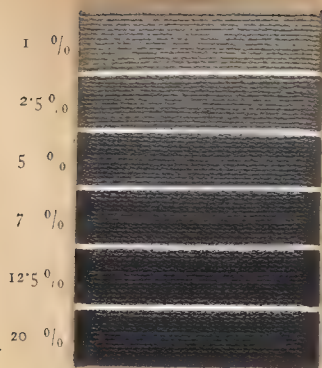
After-treated with bichrome.

Katigen Black TG. Dyed direct it produces a deep black with a greenish hue; when after-treated the slightly greenish tone still remains. This colour is preferably employed for mercerised goods. It is possessed of the same valuable properties as the SW brand. It is also suitable for the dyeing of pieces in the beck and can be dyed cold.

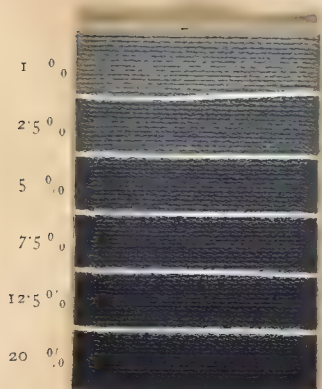


After-treated with { bichrome,
copper sulphate.

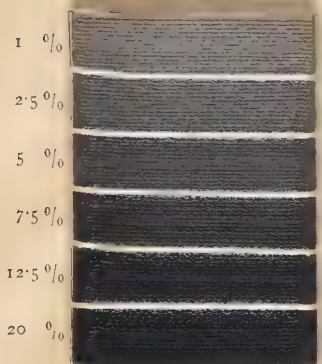
Katigen Black 2B. Dyed direct it yields a greenish black of a much brighter tone than the TG; when after-treated it produces a bluish black possessed of similar properties to the SW brand. It is suited for the dyeing of pieces in the dye beck and where an after-treatment with metallic salts or steaming is possible, it can be applied for the same purposes as the SW brand.



Dyed direct.



After treated with $\left\{ \begin{array}{l} \text{bichrome,} \\ \text{copper sulphate.} \end{array} \right.$

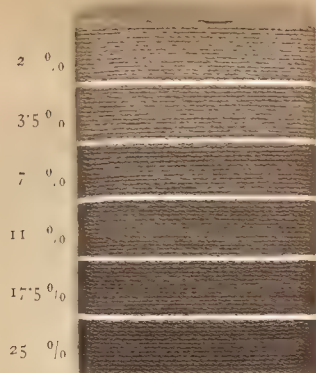


After-treated with $\left\{ \begin{array}{l} \text{bichrome,} \\ \text{copper sulphate.} \end{array} \right.$

Katigen Blue Black B. The chief value of this brand is in its direct dyed shade, which is of a bloomy bluish black tone, and which by oxidation in the air becomes bluer and brighter; the after-treatment with metallic salts has no particular effect. Properties and application of Katigen Blue Black B are the same as the SW brand.

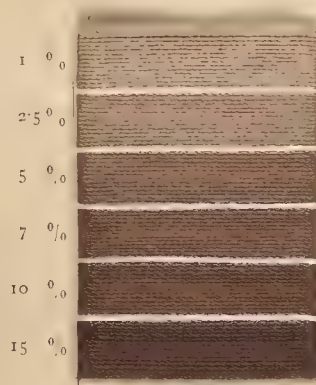
Katigen Blue Black 4B. Dyed direct it is of a bloomy black with a steel bluish hue, which when after-treated with metallic salts or aged (steamed) assumes a very bloomy bluish black shade. Properties and application: same as those of the SW brand. It is also suited for the dyeing of pieces in the ordinary dye beck, furthermore as a bluish colour for combinations with other brands that are after-treated, and is also adapted for toning down the Katigen Indigo B and R extra.

Katigen Blue Black R. Dyed direct it produces a deep blue black shade, which when treated with metallic salts or aged (steamed) assumes a bloomy violet black or black blue. Properties and applications: same as the SW brand. It is especially suited for darkening the shades of Katigen Indigo B and R extra.



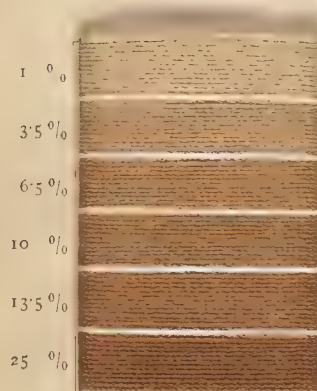
Dyed direct.

Katigen Black Brown N. Dyed direct the shade possesses remarkable fastness in every respect. It is very well suited either as a self shade or in combination with other Katigen Colours for the production of Mode or Art shades on loose cotton, yarns, pieces and velveteens. It changes very little with after-treating and the colour can be used for shading direct dyed Katigen blacks on loose cotton or warps.



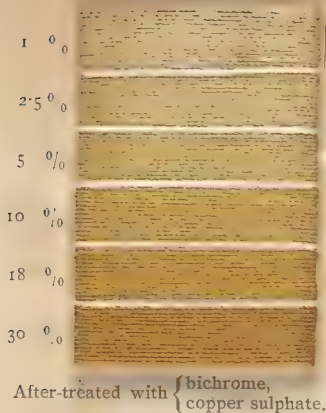
Dyed direct.

Katigen Brown V. extra. Dyed direct it yields a full violet brown, and the colour is twice as strong as Katigen Black Brown N; after-treated with bichrome and copper sulphate it assumes a rather clearer brown shade. Properties and application: same as the Katigen Black Brown N, with the exception that the fastness to scrooping of the direct-dyed shade is not quite so good as that of the Katigen Black Brown N. It is a valuable addition as a brown for shading the other Katigen Browns.

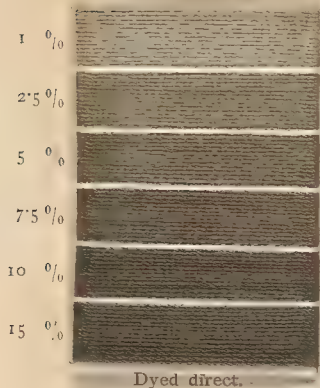


Dyed direct.

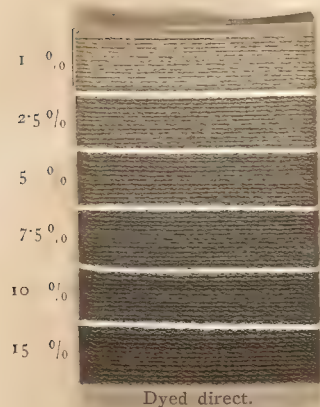
Katigen Yellow Brown GG. Dyed direct it produces a very bright yellowish brown shade, which is rendered somewhat duller when after-treated with metallic salts, however, especially in light shades it becomes still faster to light by this treatment. The colour is fast to light, perspiration, boiling and cross-dyeing. It is chiefly employed in combinations for Mode or Art shades on loose cotton, ordinary and mercerised yarn as well as for velveteens. This colour is also put on the market in double concentration under the denomination Katigen Yellow Brown GG extra.



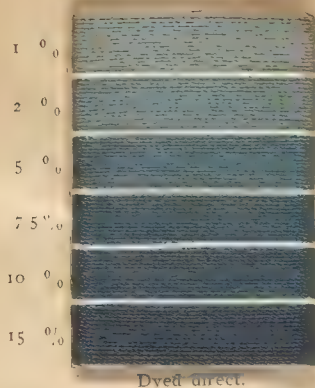
Katigen Chrome Brown 5 G. Dyed direct it is of a yellowish brown, which is fast to boiling and cross-dyeing but not so very fast to light; when after-treated with chrome and copper salts it yields a bright old gold shade very fast to light, and as such as well as in combination with other Katigen Colours is much employed for the production of Khaki shades.



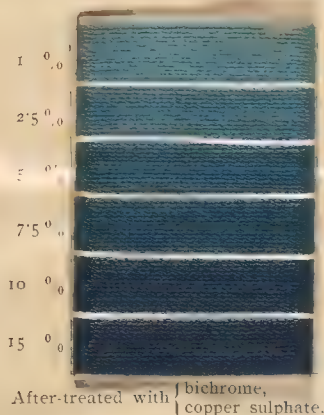
Katigen Olive G. Dyed direct it produces a rather bright olive shade, which is possessed of great fastness and when after-treated with metallic salts the shade becomes bluer and duller. It is employed in the dyeing of hanks, mercerised yarn and warps, and in combination with other Katigen Colours it can be used in all the various branches of cotton dyeing.



Katigen Olive GN. Dyed direct it is of a somewhat bluer and slightly duller shade than the G brand, but it stands the scrooping process on mercerised yarns better than the latter and is also cheaper. Properties and application (for Khaki shades) same as the G mark.

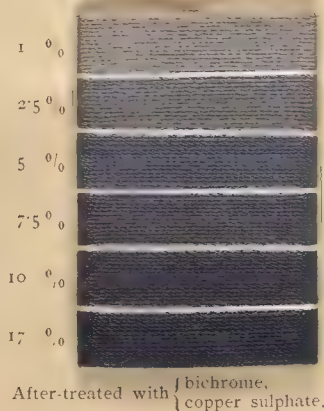


No. 22456 is still brighter in tone than the 2 B quality.



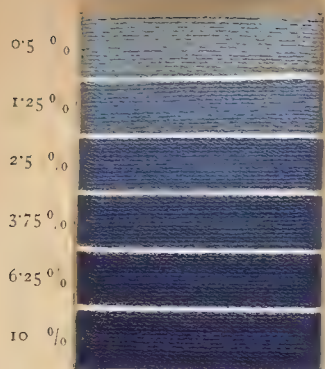
Katigen Chrome Blue 5G. Dyed direct it produces a bright green shade, which is slightly bluer than the Katigen Green 2B. The chief effect of Katigen Chrome Blue 5G is obtained when after-treated with bichrome and copper, when it assumes a bright greenish blue, which is fast in every respect. It is especially adapted for the dyeing of mercerised yarns, upholstery cloth and for all classes of machines for dyeing.

In combination with Katigen Indigo B extra clear blue shades can be obtained, which in light and medium shades are of the same greenish tone as Indigo.



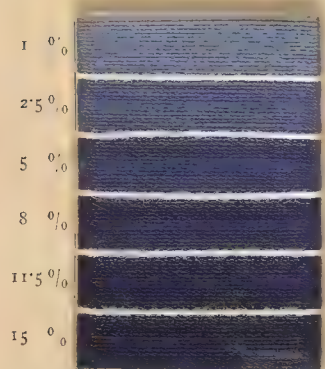
Katigen Chrome Blue 2R. Dyed direct it produces a blue black shade, and when after-treated with metallic salts it assumes a reddish navy blue shade, which when steamed becomes less reddish in tone. It is possessed of excellent dyeing properties, which make it suitable for all branches of the warp, piece and fancy woven cotton industries.

It combines very well with Katigen Indigo B and R extra for the production of dark indigo shades, but is not quite so fast to boiling as the Katigen Indigo B extra.



After treated with { bichrome,
copper sulphate.

warps. This colour is also put on the market under the denomination Katigen Indigo B, and double the quantity of the latter colour is required to produce the same depth of shade as that obtained with the B extra quality.



After treated with { bichrome,
copper sulphate.

Katigen Indigo B extra. Dyed direct it produces a Blue shade with a slightly greenish tone, which when steamed and after-treated with metallic salts assumes a bright reddish blue, which with the exception of its fastness to chlorine and the nitric acid test is superior to Indigo in every respect.

It can be employed either alone or in combination with Katigen Chrome Blue 2R, Katigen Blue Black R, or Katigen Chrome Blue 5G in every instance where the same or superior fastness to Indigo is demanded. It can also be used as a bottom for Indigo as well as for dyeing vegetable fibres in the indigo vat either alone or in combination with indigo.

Its excellent fastness to cross-dyeing is of great importance for the dyeing of cotton

Katigen Indigo R extra. This brand is considerably redder than the B extra quality, and is therefore especially suited for the dyeing of dark indigo shades either alone or in combination with Katigen Indigo B extra, Katigen Chrome Blue 5G, 2R, Katigen Blue Black R and B.

It is possessed of exactly the same properties as the B extra brand, and its behaviour in dyeing, after-treatment, indigo vat dyeing, etc. are also the same; it is, however, more easily soluble and as it dyes extremely level it is adapted for all the various branches of the cotton textile industries (dyeing well in jigs, machines, etc.)

The appended synopsis gives a better view of the suitable methods of application of the Katigen Colours (dyed direct or afterwards treated with mordants).

Dyed direct	Oxidised in the air	After-treated with bichrome and acetic acid	After-treated with bichrome, alum and acetic acid
Katigen Black SW	Katigen Black 2B	Katigen Black SW	Katigen Black SW
" Black TG	" Blue Black 4B	" " TG	" " TG
" Blue Black B	" " " B, R		
" Black Brown N	" Indigo B extra		
" Brown V extra	" " R extra		
" Indigo B extra	" Chrome Blue 2R		
" " R extra			
" YellowBrown GG			
" Olive G, GN			
" Green 2B			

After-treatment with bichrome, copper sul- phate and acetic acid	After-treatment with alum, copper sulphate and acetic acid	After-treatment with fluoride of chrome and acetic acid	After-treatment with sulphate of zinc and acetic acid
Katigen Black SW	Katigen Indigo B extra	All fashionable shades	Katigen Indigo B extra
" Black TG, 2B	" Indigo R extra		" " R extra
" Blue Black 4B, R	" Chrome Blue 2R		
" Chrome Brown 5G			
" " Blue 2R, 5G			
" Indigo B extra			
" " R extra			
All light shades			

Owing to the extensive application and adaptability of our Katigen Colours it is scarcely possible in each chapter to recapitulate all the various branches for which our Katigen Colours find employment, but we herewith append a list of the various branches for which our Katigen Colours are known to be employed:

Apron Cloth, Artificial Silk.

Braids.

Calico, Canvas, Cheeses, Cocoa-Nut Fibres, Cops, Cords, Corset

Cloth, Cotton Italians, Cotton Suitings, Chip-Plait.

Embroidery yarn, Eskimo.

Drills.

Flannelettes.

Half-Linen, Half-Silk Ribbons, Hanks.

Jute.

Knitting yarns.

Ladies' Dress Material, Linen Pieces, Linen-Yarns, Linings

Loose Cotton.

Mercerised Cotton, Moleskins.

Piece Goods, Piqué Cloth.

Ramie-yarn, Ribbons (cotton).

Sewing Thread, Silk, Sliver, Stockings.

Umbrella Cloth, Upholstery Cloth.

Velveteen, Venetian Blind Sashes.

Warps, Warp on Beams, Window-Blinds, Wood.

Yarn, Loose Cotton or Piece Goods dyed with Katigen Colours are employed for

Beltings, Braces.

Caps, Children's Suitings.

Discharge Styles. (Printing.)

Elastic Webs.

Fancy Woven Goods.

Game Bags.

Half-Woollen Pieces, Half-Woollen Yarn, Hosieries.

Jersies.

Knapsacks.

Mohair.

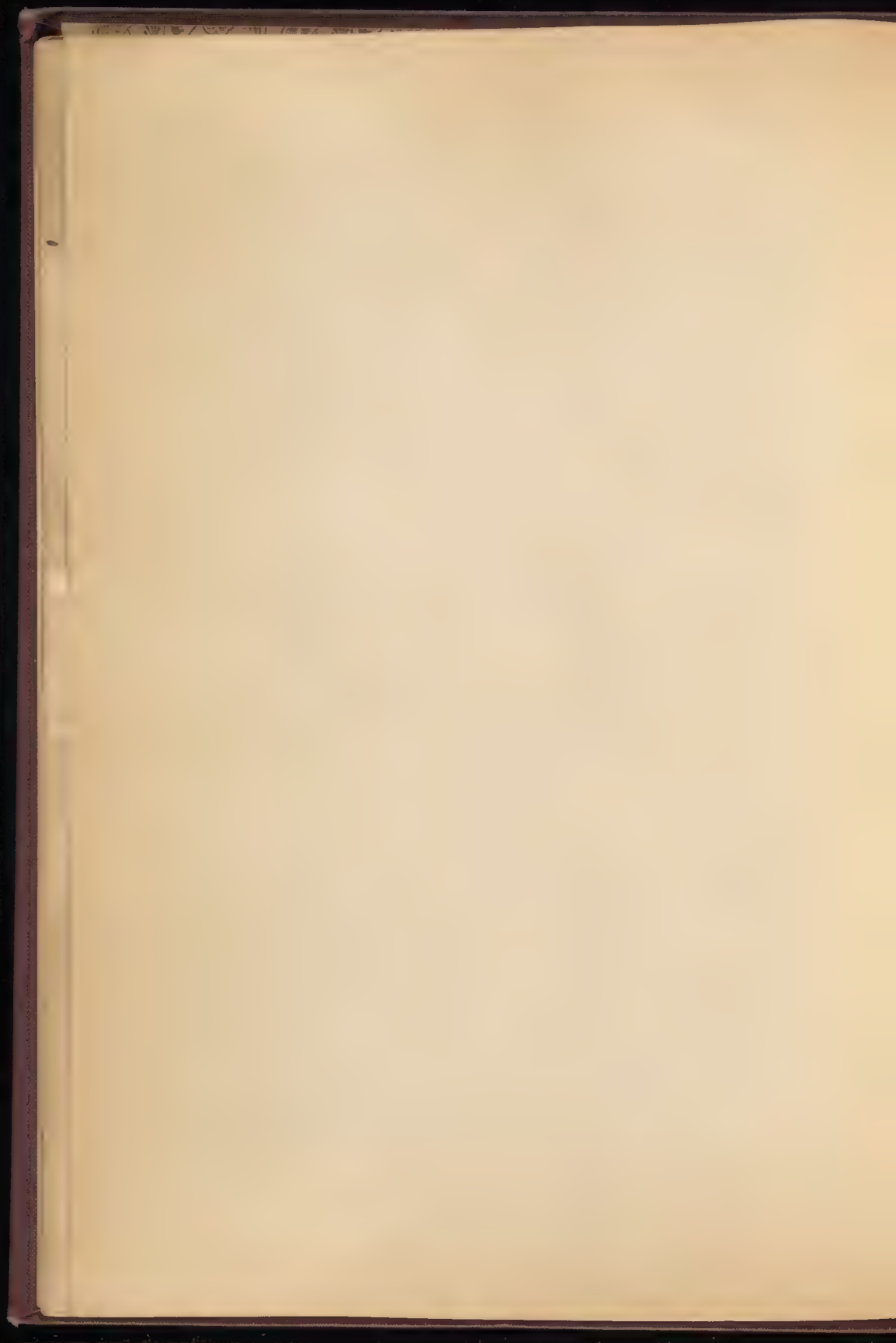
Polished Cotton Yarn.

Trimmings.

Umbrella Cloth.

Part II.

The Dyeing of loose Cotton.



Part II.

The Dyeing of loose Cotton in the open dye Vessel.

(The dye vessel should be made of wood, iron, tin
or nickel-plated copper.)

General Remarks: In the dyeing of loose cotton absolute evenness of shade is not of vital importance; it is therefore not necessary to previously boil or wet out the loose cotton but to prepare the dye bath in such a way that the cotton will be quickly and uniformly penetrated. The water is boiled up first with soda ash and then the froth is skimmed off; afterwards add the Turkey Red Oil and lastly the colour, previously dissolved with sulphide of soda, boil up for a short time, then add the salt, boil again vigorously for 5—10 mins. then reduce the steam so as to keep the bath just on the simmer. The proper concentration to produce the best results should be 18:1 of goods.

Enter the dry loose cotton, work thoroughly for a quarter of an hour, dye for another $\frac{3}{4}$ hour without steam, then fish out the cotton on to the stillage or scray and allow to drain; it is still more economical as regards saving of colour to hydro-extract in an iron or galvanised iron hydro-extractor.

After extracting the superfluous liquor the loose cotton is allowed to lie 1—2 hours (or over night,) and pulled over several times before rinsing, whereby the shades become deeper and brighter. Finally rinse, first in luke warm water, then thoroughly in cold water, hydro-extract and dry.

Loose cotton is not generally after-treated, as the metallic salts would produce a more or less harsh handle, which would cause difficulties in spinning. In the spinning of soft yarns where the fibre is subjected to oiling, the loose cotton can be after-treated without hesitation with metallic salts; in such cases soda or ammonia must be added to the scouring bath in small quantities. (Please refer to the general part page 11.)

**1. Katigen Black SW, Katigen Blue Black B, Katigen Black 2B,
Katigen Blue Black 4B, R.**

Directions for dyeing 100 lbs. of loose cotton: volume of dye liquor 18:1 of goods.

	1st Bath	2nd Bath	3rd Bath	4th or standing Bath
	18—25 lbs.	14½—20 lbs.	12½—17½ lbs.	10½—15 lbs.
Dyestuff				
Sulphide of soda cryst. (or half the quantity of concentrated)	18—25 "	12—16 "	10—13 "	8—12 "
Soda ash*)	8 "	4 "	2 "	2 "
Turkey Red Oil**).	2—3 "	½ "	½ "	¼—½ "
Glauber's salt crystals (common salt half the amount)	60 "	30 "	15 "	6 "

The quantity of colour required depends upon the desired depth of shade or the absorbing power of the respective quality of loose cotton. For low qualities of American cotton the colour will go on better if the quantity of soda above stated viz. 8% be substituted by

{ 4 lbs. soda ash and
{ 7 pints caustic soda liquor 65—70° Tw.

It is quite sufficient to produce the desired shade of Katigen Black SW and Katigen Blue Black B by simply exposing the dyed goods to the oxidising action of the air; for the other qualities the bloomy and bluish tone is considerably improved by severe steaming after the direct dyed cotton has been hydroextracted or allowed to drain off. For such after-treatment the addition of caustic soda liquor in the above scale is provided for.

The steaming can be done in an ordinary wooden dye vessel the sides of which are lined with canvas, and the steam pipes running through the vessel should also be covered up with canvas. Then close up the dye vessel with a wooden lid, the inside of which is also lined with canvas, and then inject steam and air simultaneously for about ¾ hour. The hotter and drier the steam the quicker and more completely will the development take place. When steamed, rinse and hydroextract.

Loose cotton dyed with the different brands of Katigen Blacks remains soft and never becomes matted, and therefore gives very little waste in spinning; a further valuable feature is, that hitherto loose cotton could not be dyed in such a simple way and so extremely fast as now with Katigen Colours. Although loose cotton as a rule is not generally after-treated or developed with metallic salts, the goods can nevertheless be subjected to such treatment if the degree of fastness should require it.

*) When working with the addition of Caustic soda liquor, the addition of soda ash is correspondingly decreased.

**) In employing Turkey Red Oil care should be taken to use only soft or purified water in the first rinsing bath, so as to prevent the formation of a lime soap, which would have a bad effect on the cotton for spinning.

For the production of a cheap deep black shade on loose cotton a combination of Katigen Black SW and Katigen Black Brown N has been employed to advantage and has met with general favour: we give you appended a scale for the dyeing of such a combination:

Volume of Dye Liquor 15:1 of goods	1st Bath	2nd Bath	3rd Bath	4th and standing Bath
Katigen Black SW	18 $\frac{0}{0}$	14 $\frac{10}{0}$	12 $\frac{10}{0}$	10 $\frac{10}{0}$
Katigen Black Brown N	7 $\frac{0}{0}$	5 $\frac{10}{0}$	5 $\frac{0}{0}$	4 $\frac{10}{0}$
Sulphide of soda crystals (or half the quantity of concentrated)	18 $\frac{0}{0}$	12 $\frac{0}{0}$	10 $\frac{0}{0}$	8 $\frac{0}{0}$
Soda ash	8 $\frac{0}{0}$	4 $\frac{0}{0}$	2 $\frac{0}{0}$	2 $\frac{0}{0}$
Glauber's salt crystals (common salt half the amount)	60 $\frac{0}{0}$	30 $\frac{0}{0}$	15 $\frac{0}{0}$	8 $\frac{0}{0}$
Turkey Red Oil	2 $\frac{0}{0}$	1 $\frac{0}{0}$	1 $\frac{0}{0}$	1 $\frac{0}{0}$

Dye as above described.

2. Katigen Indigo B extra and R extra; Katigen Chrome Blue 2R.

Katigen Indigo B extra and R extra when dyed direct on loose cotton produce a bright, clear reddish blue, which assumes a still redder and clearer tone when subjected to the action of the air (steamed). As a rule an after-treatment with metallic salts or steaming is not necessary for loose cotton, as the spontaneous oxidation by the action of the oxygen in the atmosphere on and through the porous material proceeds very quickly and thoroughly. Shades thus obtained are very fast indeed, and need not be topped with basic colours, but on the contrary for ordinary blues, the R and B brands require to be toned down with Katigen Chrome Blue 2R, Katigen Blue Black R, etc. In cases where the fastest diazotisable Blues (Dialzo Indigo Blue M, BR extra, etc.) do not meet the respective requirements, Katigen Indigo, dyed either alone or in combination with the above mentioned brands can be employed. In short the dyer is able to produce by a cheap and simple method Indigo shades possessed of fastness to washing, boiling, cross-dyeing and light, that can scarcely be surpassed.

a) Light Blue on loose cotton. For such a shade a slightly greenish indigo blue is understood, and in most cases the self shade of Katigen Indigo B will be found too reddish; we therefore recommend a combination of Katigen Indigo B or B extra with Katigen Green 2B or Katigen Chrome Blue 5G.

Volume of Dye Liquor 15:1 of goods	1st Bath	Standing Bath
Katigen Indigo B (B extra half the amount)	5 $\frac{0}{0}$	4 $\frac{10}{0}$
Katigen Green 2B	1 $\frac{0}{0}$	2 $\frac{0}{0}$
Sulphide of soda crystals	7 $\frac{10}{0}$	3 $\frac{0}{0}$
Soda ash	4 $\frac{0}{0}$	1 $\frac{0}{0}$
Turkey Red Oil	3 $\frac{0}{0}$	1 $\frac{0}{0}$
Glauber's salt crystals (common salt half the amount)	5 $\frac{0}{0}$	10 $\frac{0}{0}$

Boil up in the ordinary way with soda and skim if necessary, then add the Turkey Red Oil, then the colour, previously dissolved in hot water with the addition of sulphide of soda, boil up again, add the salt and continue boiling for 8—10 mins. After shutting off steam enter the goods, work frequently for the first $\frac{1}{2}$ hour and dye for a further $\frac{1}{2}$ hour, giving the cotton an occasional turn.

When dyed fish out the cotton on to the stillage or scray so that the cotton can drain (or if possible hydroextract) and spread the cotton out in the open air for some time without rinsing, and when the desired shade is obtained rinse thoroughly and dry.

b) Medium Blue on loose cotton. Should a very clear, bright Blue shade be required then employ the self shade of Katigen Indigo B or B extra or the R extra brand, as for medium shades the reddish natural indigo tone down hand is obtained.

Volume of Dye Liquor 18:1 of goods	1st Bath	Standing Bath
Katigen Indigo B (B extra or R extra half the amount)	12 $\frac{0}{10}$	8 $\frac{10}{10}$
Sulphide of soda crystals	18 $\frac{0}{10}$	7 $\frac{0}{10}$
Soda ash	6 $\frac{0}{10}$	1 $\frac{0}{10}$
Turkey Red Oil	2 $\frac{0}{10}$	$\frac{1}{2}$ $\frac{0}{10}$
Glauber's salt crystals (common salt half the amount)	10 $\frac{0}{10}$	1 $\frac{0}{10}$

The method of working is the same as described for light blues.

Should fuller shades be desired we recommend a combination of Katigen Indigo B and Katigen Chrome Blue 2R, Katigen Blue Black R or 4B; the last mentioned brand produces the more greenish tones.

To accelerate the development of medium blues the goods can be steamed in the same way as described on page 22 for Blacks.

We give you below a few recipes for some very popular medium blues.

Reddish bright Medium Blue.

Volume of Dye Liquor 18:1 of goods	1st Bath	2nd Bath	Standing Bath
Katigen Indigo B (B extra only half the amount)	8 $\frac{0}{10}$	6 $\frac{4}{10}$	5 $\frac{0}{10}$
Katigen Blue Black R	3 $\frac{0}{10}$	2 $\frac{4}{10}$	1 $\frac{8}{10}$
Sulphide of soda crystals	15 $\frac{0}{10}$	8 $\frac{0}{10}$	4 $\frac{0}{10}$
Soda ash	8 $\frac{0}{10}$	4 $\frac{0}{10}$	2 $\frac{0}{10}$
Turkey Red Oil	2 $\frac{0}{10}$	$\frac{1}{2}$ $\frac{0}{10}$	$\frac{1}{2}$ $\frac{0}{10}$
Glauber's salt crystals (common salt half the amount)	10 $\frac{0}{10}$	5 $\frac{0}{10}$	1 $\frac{0}{10}$

Medium Blue with a slightly greenish shade over hand.

Volume of Dye Liquor 18:1 of goods	1st Bath	2nd Bath	Standing Bath
Katigen Indigo B	1 ⁶⁰ / ₀	1 ⁴⁰ / ₀	1 ⁰ / ₀
Katigen Blue Black 4B	6 ¹ / ₂ ⁰ / ₀	5 ⁰ / ₀	4 ⁰ / ₀
Sulphide of soda crystals	12 ⁰ / ₀	6 ⁰ / ₀	3 ⁰ / ₀
Soda ash	8 ⁰ / ₀	4 ⁰ / ₀	2 ⁰ / ₀
Turkey Red Oil	2 ⁰ / ₀	2 ¹⁰ / ₀	2 ¹⁰ / ₀
Glauber's salt crystals (common salt half the amount)	10 ⁰ / ₀	5 ⁰ / ₀	1 ⁰ / ₀

Should the loose cotton have to be steamed then, as already mentioned above, the quantity of soda should be substituted with half the amount of caustic soda 68—70° Tw. It has to be taken into consideration that the combination given above, when afterwards treated with bichrome and copper, produces a brighter and redder shade on yarn. Should a reddish and bright shade be desired then it is better to employ Katigen Indigo R extra as a self shade or in combination as above.

c) Navy Blue on loose cotton. For the production of such shades of a bright and clear tone Katigen Indigo B or B extra or R extra can also be employed to advantage.

Volume of Dye Liquor 18:1 of goods	1st Bath	2nd Bath	Standing Bath
Katigen Indigo B (B extra or R extra half the amount)	20 ⁰ / ₀	16 ⁰ / ₀	12 ⁰ / ₀
Sulphide of soda crystals	30 ⁰ / ₀	15 ⁰ / ₀	8 ⁰ / ₀
Soda ash	8 ⁰ / ₀	4 ⁰ / ₀	2 ⁰ / ₀
Turkey Red Oil	3 ⁰ / ₀	1 ⁰ / ₀	2 ¹⁰ / ₀
Glauber's salt crystals (common salt half the amount)	15 ⁰ / ₀	7 ⁰ / ₀	12 ⁰ / ₀

Method of dyeing is the same as for light blues; although it is not always absolutely necessary a thorough steaming is of advantage. In most cases the Blue thus obtained is by far too clear and bright, and a combination of Katigen Chrome Blue 2R and Katigen Blue Black R is preferred to the self shade of Katigen Indigo R, e. g. with the following combination a deep reddish dark blue can be obtained:

Volume of Dye Liquor 18:1 of goods	1st Bath	Standing Bath
Katigen Indigo B (B extra half the amount)	16 ⁰ / ₀	10 ⁰ / ₀
Katigen Blue Black R	6 ⁰ / ₀	3 ¹⁰ / ₀
Sulphide of soda crystals	30 ⁰ / ₀	8 ⁰ / ₀
Soda ash	8 ⁰ / ₀	2 ⁰ / ₀
Turkey Red Oil	3 ⁰ / ₀	2 ¹⁰ / ₀
Glauber's salt crystals (common salt half the amount)	15 ⁰ / ₀	12 ¹⁰ / ₀

For the second bath the percentages of colour and ingredients can be reduced on a sliding scale as given for the dark blues: By replacing the Katigen Blue Black R with Katigen Chrome Blue 2R or the Katigen Indigo B extra with the R extra still redder shades can be obtained.

3. Katigen Black Brown N, Katigen Brown V extra, Katigen Yellow Brown GG or GG extra.

Directions for dyeing 100lbs. of loose cotton: volume of dye liquor 18:1 of goods.

a) Dark Brown.

	1st Bath	Standing Bath
Katigen Black Brown N	35 lbs.	20 lbs.
Sulphide of soda crystals (concentrated half the amount)	5 "	1 "
Soda ash*)	8 "	2 "
Turkey Red Oil	2 "	$\frac{1}{4}$ "
Glauber's salt crystals (common salt half the amount)	80 "	8 "

b) Medium Yellowish Brown.

	1st Bath	Standing Bath
Katigen Yellow Brown GG (GG extra half the amount)	15 lbs.	9 lbs.
Sulphide of soda crystals	3 "	$\frac{1}{2}$ "
Soda ash	8 "	2 "
Turkey Red Oil	2 "	$\frac{1}{4}$ "
Glauber's salt crystals (common salt half the amount)	60 "	6 "

For a violet dark brown shade the Katigen Black Brown N in the recipe a) (Dark Brown) can be substituted with half the quantity of Katigen Brown V extra, the other percentages of the ingredients remaining unaltered. For the very popular reddish brown shades we recommend the following combinations of Katigen Brown V extra and Katigen Black Brown N or Katigen Yellow Brown GG: the cost of dyeing these shades is very low owing to the great productiveness of the colours, especially the V extra brand.

c) Bright reddish Brown.

	1st Bath	Standing Bath
Katigen Yellow Brown GG (GG extra half the amount)	15 lbs.	9 lbs.
Katigen Brown V extra	4 "	$2\frac{1}{2}$ "
Sulphide of soda crystals	3 "	$\frac{1}{2}$ "
Soda ash	8 "	2 "
Turkey Red Oil	2 "	$\frac{1}{2}$ "
Glauber's salt crystals (common salt half the amount)	60 "	$\frac{1}{2}$ "

*) As regards the addition of Caustic soda Liquor please refer to page 22 under Katigen Black SW.

d) Full reddish Brown.

	1st Bath	Standing Bath
Katigen Black Brown N	15 lbs.	9 lbs.
Katigen Brown V extra	5 "	3 "
Sulphide of soda crystals	3 "	$\frac{1}{2}$ "
Soda ash	8 "	2 "
Turkey Red Oil	2 "	$\frac{1}{4}$ "
Glauber's salt crystals (common salt half the amount)	60 "	5 "

Prepare the dye bath, dye and proceed in the same way as for Katigen Black; when dyed fish out etc. and hydroextract; as ageing or exposure to the atmosphere has little effect on these colours they can be rinsed immediately after they are hydroextracted. For directions for dyeing mode or art shades with the above colours please refer to Part VII "Fashionable and Khaki shades produced with Katigen Colours".

Katigen Chrome Brown 5G, which should find mention here for loose cotton, is not so well adapted for this purpose, as it must be after-treated with metallic salts in order to produce the greenish old gold shade and to improve its fastness to light.

Brown shades obtained with Katigen Black Brown N, Katigen Brown V extra and Katigen Yellow Brown GG dyed either in self shades or in combination are remarkably fast, and further possess the advantage, like the Katigen Blacks, of leaving the loose cotton soft and pliable for spinning. For further particulars please refer to Part VII.

4. Katigen Green 2B.

Directions for dyeing 100 lbs. goods: volume of dye liquor 18:1 of goods.

	1st Bath	Standing Bath
Katigen Green 2B	12 lbs.	7 $\frac{1}{2}$ lbs.
Sulphide of soda crystals	2 "	$\frac{1}{2}$ "
Soda ash	8 "	2 "
Turkey Red Oil	2 "	$\frac{1}{4}$ "
Glauber's salt crystals (common salt half the amount)	25 "	3 $\frac{1}{2}$ "

The method of dyeing is exactly the same as described for Katigen Black Brown N: it has hitherto not been possible to produce a green of the same fastness and brightness as Katigen Green 2B, and the loose cotton is left soft and pliable for spinning.

Katigen Chrome Blue 5G dyed in the same way as Katigen Green 2B produces a slightly bluer tone; to get the proper shade, however, it has to be after-treated with metallic salts but this treatment is objected to for loose cotton. If there is no objection to this method, work as described in the chapter on yarn dyeing.

A combination of Katigen Green 2B and Katigen Indigo B extra dyed direct produces the same shade as that of Katigen Chrome Blue 5G when after-treated.

5. Katigen Olive G, GN.

Directions for dyeing 100 lbs. goods (medium Olive shade).
Volume of dye liquor 18:1 of goods.

	1st Bath	Standing Bath
Katigen Olive GN or G	12 lbs.	7½ lbs.
Sulphide of soda crystals	2 "	½ "
Soda ash	8 "	2 "
Turkey Red Oil	2 "	¼ "
Glauber's salt crystals (common salt half the amount)	40 "	5½ "

Dye in the same way as described for Katigen Black Brown N; Katigen Olives are seldom employed as self shades on loose cotton; they are generally toned down with Katigen Black Brown N or shaded with Katigen Yellow Browns, vide Part VII "Fashionable and Khaki shades".

Patterns of Loose Cotton.

(The percentages in brackets refer to standing baths.)

1. 25% Katigen Black SW [15]
 25% sulphide of soda crystals [12]
 8% soda ash [2]
 60% Glauber's salt crystals [6] or
 30% common salt [3]
 2% Turkey red oil [0.25]
2. 25% Katigen Black 2 B [15]
 25% sulphide of soda crystals [12]
 8% soda ash [2]
 60% Glauber's salt crystals [6] or
 30% common salt [3]
 2% Turkey red oil [0.25]
3. 25% Katigen Blue Black 4 B [15]
 25% sulphide of soda crystals [12]
 8% soda ash [2]
 60% Glauber's salt crystals [6] or
 30% common salt [3]
 2% Turkey red oil [0.25]
4. 25% Katigen Blue Black B [15]
 25% sulphide of soda crystals [12]
 8% soda ash [2]
 60% Glauber's salt crystals [6] or
 30% common salt [3]
 2% Turkey red oil [0.25]
5. 25% Katigen Blue Black R [15]
 25% sulphide of soda crystals [12]
 8% soda ash [2]
 60% Glauber's salt crystals [6] or
 30% common salt [3]
 2% Turkey red oil [0.25]
6. 25% Katigen Chrome Blue 2 R [15]
 20% sulphide of soda crystals [10]
 8% soda ash [2]
 40% Glauber's salt crystals [4] or
 20% common salt [4]
 2% Turkey red oil [0.25]
7. 15% Katigen Indigo R extra [9]
 22% sulphide of soda crystals [9]
 6% soda ash [2]
 15% Glauber's salt crystals [1.5] or
 7.5% common salt [0.8]
 2% Turkey red oil [0.25]
8. 15% Katigen Indigo R extra [9]
 22.5% sulphide of soda crystals [9]
 6% soda ash [2]
 15% Glauber's salt crystals [1.5] or
 7.5% common salt [0.8]
 2% Turkey red oil [0.25]

Steamed.

Loose Cotton.

1.



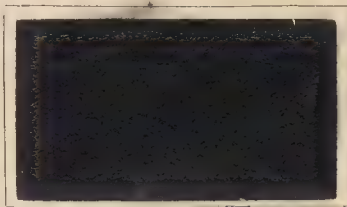
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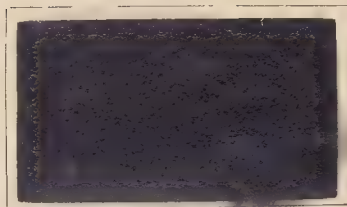
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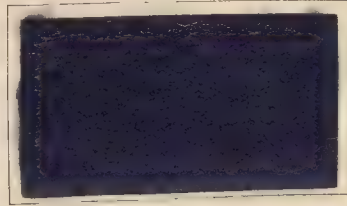
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7.



8.

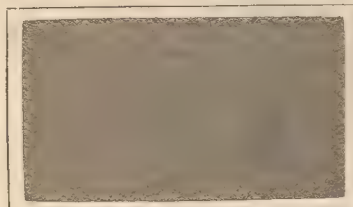


(The percentages in brackets refer to standing baths.)

9. 2 $\frac{0}{10}$ Katigen Black Brown N [2]
 1.5 $\frac{0}{10}$ Katigen Olive GN [1.5]
 2.5 $\frac{0}{10}$ sulphide of soda crystals [0.5]
 2 $\frac{0}{10}$ soda ash [1]
 15 $\frac{0}{10}$ Glauber's salt crystals [1.5] or
 7.5 $\frac{0}{10}$ common salt [0.75]
 2 $\frac{0}{10}$ Turkey red oil [0.25]
10. 8 $\frac{0}{10}$ Katigen Yellow Brown GG [6]
 8 $\frac{0}{10}$ Katigen Black Brown N [6]
 2.5 $\frac{0}{10}$ sulphide of soda crystals [0.25]
 7 $\frac{0}{10}$ soda ash [1]
 30 $\frac{0}{10}$ Glauber's salt crystals [3] or
 16 $\frac{0}{10}$ common salt [1.5]
 2 $\frac{0}{10}$ Turkey red oil [0.25]
11. 7 $\frac{0}{10}$ Katigen Olive GN [5]
 4 $\frac{0}{10}$ Katigen Black SW [3]
 10 $\frac{0}{10}$ Katigen Green 2 B [6]
 5 $\frac{0}{10}$ sulphide of soda crystals
 8 $\frac{0}{10}$ soda ash [1]
 40 $\frac{0}{10}$ Glauber's salt crystals [4] or
 20 $\frac{0}{10}$ common salt [2]
 2 $\frac{0}{10}$ Turkey red oil [0.25]
12. 1 $\frac{0}{10}$ Katigen Yellow Brown GG [0.8]
 1 $\frac{0}{10}$ sulphide of soda crystals [0.5]
 1 $\frac{0}{10}$ soda ash [1]
 10 $\frac{0}{10}$ Glauber's salt crystals [1] or
 5 $\frac{0}{10}$ common salt [0.5]
 2 $\frac{0}{10}$ Turkey red oil [0.25]
13. 10 $\frac{0}{10}$ Katigen Black Brown N [6]
 22 $\frac{0}{10}$ Katigen Yellow Brown GG [14]
 5 $\frac{0}{10}$ sulphide of soda crystals [0.5]
 9 $\frac{0}{10}$ soda ash [1]
 60 $\frac{0}{10}$ Glauber's salt crystals [6] or
 30 $\frac{0}{10}$ common salt [3]
 2 $\frac{0}{10}$ Turkey red oil [0.25]
14. 7.5 $\frac{0}{10}$ Katigen Indigo B extra [4.5]
 3 $\frac{0}{10}$ Katigen Chrome Blue 2 R [2]
 15 $\frac{0}{10}$ sulphide of soda crystals [3]
 6 $\frac{0}{10}$ soda ash [1]
 15 $\frac{0}{10}$ Glauber's salt crystals [1.5] or
 7.5 $\frac{0}{10}$ common salt [0.75]
 2 $\frac{0}{10}$ Turkey red oil [0.25]
15. 1.25 $\frac{0}{10}$ Katigen Indigo B extra [1.25]
 2.5 $\frac{0}{10}$ sulphide of soda crystals [1]
 2 $\frac{0}{10}$ soda ash [1]
 10 $\frac{0}{10}$ Glauber's salt crystals [1] or
 5 $\frac{0}{10}$ common salt [0.5]
 2 $\frac{0}{10}$ Turkey red oil [0.25]
16. 10 $\frac{0}{10}$ Katigen Green 2 B [6]
 10 $\frac{0}{10}$ Katigen Olive GN [6]
 3 $\frac{0}{10}$ sulphide of soda crystals [0.5]
 8 $\frac{0}{10}$ soda ash [3]
 40 $\frac{0}{10}$ Glauber's salt crystals [4] or
 20 $\frac{0}{10}$ common salt [2]
 2 $\frac{0}{10}$ Turkey red oil [0.25]

Loose Cotton.

9.



10.



11.



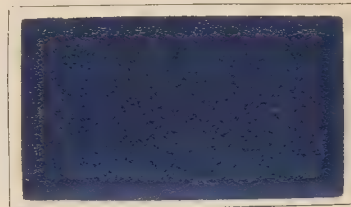
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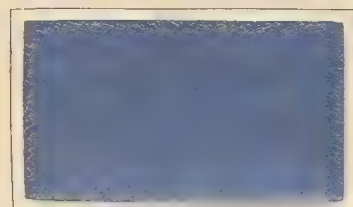
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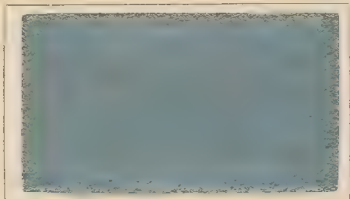


(The percentages in brackets refer to standing baths.)

17. 1 $\frac{0}{100}$ Katigen Green 2B [1]
0.5 $\frac{0}{100}$ sulphide of soda crystals [0.25]
2 $\frac{0}{100}$ soda ash [1]
10 $\frac{0}{100}$ Glauber's salt crystals [1] or
5 $\frac{0}{100}$ common salt [0.5]
2 $\frac{0}{100}$ Turkey red oil [0.25]
18. 12 $\frac{0}{100}$ Katigen Black Brown N [8]
5 $\frac{0}{100}$ Katigen Olive GN [3]
3 $\frac{0}{100}$ sulphide of soda crystals [0.5]
7 $\frac{0}{100}$ soda ash [1]
30 $\frac{0}{100}$ Glauber's salt crystals [3] or
15 $\frac{0}{100}$ common salt [3]
2 $\frac{0}{100}$ Turkey red oil [0.25]
19. 1 $\frac{0}{100}$ Katigen Black SW [1]
1 $\frac{0}{100}$ sulphide of soda crystals [1]
2 $\frac{0}{100}$ soda ash [1]
10 $\frac{0}{100}$ Glauber's salt crystals [1] or
5 $\frac{0}{100}$ common salt [0.5]
2 $\frac{0}{100}$ Turkey red oil [0.25]
20. 20 $\frac{0}{100}$ Katigen Yellow Brown GG [12]
3 $\frac{0}{100}$ sulphide of soda crystals [0.5]
6 $\frac{0}{100}$ soda ash [1]
40 $\frac{0}{100}$ Glauber's salt crystals [4] or
20 $\frac{0}{100}$ common salt [2]
2 $\frac{0}{100}$ Turkey red oil [0.25]
21. 0.2 $\frac{0}{100}$ Katigen Yellow Brown GG [0.2]
0.8 $\frac{0}{100}$ Katigen Black Brown N [0.8]
1 $\frac{0}{100}$ sulphide of soda crystals [0.5]
2 $\frac{0}{100}$ soda ash [1]
10 $\frac{0}{100}$ Glauber's salt crystals [1] or
5 $\frac{0}{100}$ common salt [0.5]
2 $\frac{0}{100}$ Turkey red oil [0.25]
22. 3 $\frac{0}{100}$ Katigen Black Brown N [2.5]
3 $\frac{0}{100}$ Katigen Olive GN [2.5]
1 $\frac{0}{100}$ sulphide of soda crystals [0.5]
3 $\frac{0}{100}$ soda ash [1]
20 $\frac{0}{100}$ Glauber's salt crystals [2] or
10 $\frac{0}{100}$ common salt [1]
2 $\frac{0}{100}$ Turkey red oil [0.25]
23. 6 $\frac{0}{100}$ Katigen Black Brown N [5]
3 $\frac{0}{100}$ Katigen Olive GN [2.8]
1 $\frac{0}{100}$ Katigen Black SW [1]
2 $\frac{0}{100}$ sulphide of soda crystals [1]
6 $\frac{0}{100}$ soda ash [1]
20 $\frac{0}{100}$ Glauber's salt crystals [2] or
10 $\frac{0}{100}$ common salt [1]
2 $\frac{0}{100}$ Turkey red oil [0.25]
24. 7 $\frac{0}{100}$ Katigen Green 2B [4.3]
0.5 $\frac{0}{100}$ Katigen Yellow Brown GG [0.5]
1 $\frac{0}{100}$ sulphide of soda crystals [0.5]
4 $\frac{0}{100}$ soda ash [1]
20 $\frac{0}{100}$ Glauber's salt crystals [2] or
10 $\frac{0}{100}$ common salt [1]
2 $\frac{0}{100}$ Turkey red oil [0.25]

Loose Cotton.

17.



18.



19.



20.



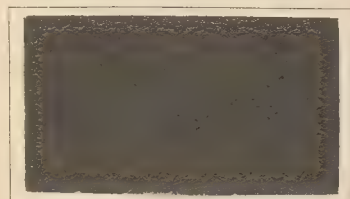
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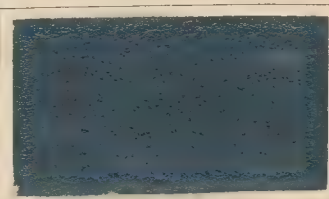
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23.



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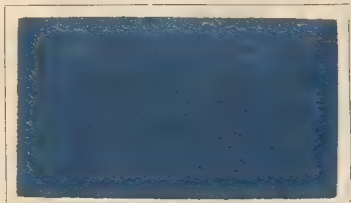


(The percentages in brackets refer to standing baths.)

25. 1.75% Katigen Indigo B extra [1.75]
2% Katigen Chrome Blue 5G [2]
5% sulphide of soda crystals [1]
3% soda ash [1]
10% Glauber's salt crystals [1] or
5% common salt [0.5]
2% Turkey red oil [0.25]
26. 15% Katigen Green 2B [9]
5% Katigen Black SW [3]
15% sulphide of soda crystals [2]
8% soda ash [2]
40% Glauber's salt crystals [4] or
20% common salt [2]
1% Turkey red oil [0.25]
27. 7% Katigen Olive GN [5]
8% Katigen Yellow Brown GG [5]
2% sulphide of soda crystals [0.5]
6% soda ash [2]
30% Glauber's salt crystals [3] or
15% common salt [1.5]
2% Turkey red oil [0.25]
28. 2% Katigen Black Brown N [2]
0.5% Katigen Olive GN [0.5]
1% sulphide of soda crystals [0.5]
2% soda ash [1]
10% Glauber's salt crystals [1] or
5% common salt [0.5]
2% Turkey red oil [0.25]
29. 10% Katigen Black Brown N [6]
1.5% Katigen Black SW [1.5]
3% sulphide of soda crystals [1]
5% soda ash [1]
24% Glauber's salt crystals [2.5] or
12% common salt [1.25]
2% Turkey red oil [0.25]
30. 25% Katigen Black Brown N [15]
5% sulphide of soda crystals [0.5]
8% soda ash [1]
50% Glauber's salt crystals [5] or
25% common salt [2.5]
2% Turkey red oil [0.25]
31. 4.5% Katigen Black Brown N [4.5]
0.5% Katigen Olive GN [0.5]
0.3% Katigen Black SW [0.3]
1% sulphide of soda crystals [0.5]
3% soda ash [1]
20% Glauber's salt crystals [2] or
10% common salt [1]
2% Turkey red oil [0.25]
32. 2.5% Katigen Yellow Brown GG [2.5]
2% sulphide of soda crystals [0.5]
2% soda ash [1]
15% Glauber's salt crystals or
7.5% common salt
2% Turkey red oil [0.25]

Loose Cotton.

25.



26.



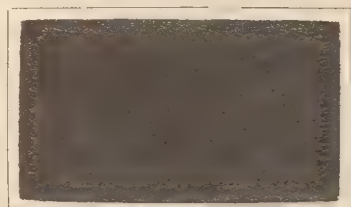
27.



28.



29.



30.



31.



32.



(The percentages in brackets refer to standing baths.)

- | | |
|--|---|
| <p>33. 3% Katigen Indigo R extra [3]
 6% sulphide of soda crystals [4]
 2% soda ash [1]
 10% Glauber's salt crystals [1] or
 5% common salt [0.5]
 2% Turkey red oil [0.5]</p> | <p>34. 7.5% Katigen Indigo R extra [4.5]
 15% sulphide of soda crystals [5]
 6% soda ash [1]
 10% Glauber's salt crystals [1] or
 5% common salt [0.5]
 2% Turkey red oil [0.25]</p> |
| <p>35. 12.5% Katigen Indigo R extra [7.5]
 20% sulphide of soda crystals [10]
 6% soda ash [2]
 15% Glauber's salt crystals [1.5] or
 7.5% common salt [0.75]
 2% Turkey red oil [0.25]</p> | <p>36. 1% Katigen Olive GN [1]
 0.5% Katigen Brown V extra [0.5]
 1% Katigen Yellow Brown GG [1]
 1% sulphide of soda crystals [0.5]
 2% Soda ash [1]
 10% Glauber's salt crystals [1] or
 5% common salt [0.5]
 2% Turkey red oil [0.25]</p> |
| <p>37. 10% Katigen Brown V extra [6]
 2% sulphide of soda crystals [0.5]
 6% soda ash [1]
 50% Glauber's salt crystals [5] or
 25% common salt [2.5]
 2% Turkey red oil [0.25]</p> | <p>38. 15% Katigen Yellow Brown GG [9]
 2% Katigen Brown V extra [1.5]
 8% sulphide of soda crystals [3]
 6% soda ash [1]
 50% Glauber's salt crystals [5] or
 25% common salt [2.5]
 2% Turkey red oil [0.25]</p> |
| <p>39. 15% Katigen Black Brown N [9]
 5% Katigen Brown V extra [3]
 3% sulphide of soda crystals [0.5]
 8% soda ash [2]
 60% Glauber's salt crystals [6] or
 30% common salt [3]
 2% Turkey red oil [0.25]</p> | <p>40. 3% Katigen Yellow Brown GG [3]
 0.75% Katigen Brown V extra [0.75]
 1% sulphide of soda crystals [0.5]
 2% soda ash [2]
 10% Glauber's salt crystals [1] or
 5% common salt [0.5]
 2% Turkey red oil [0.25]</p> |

Loose Cotton.

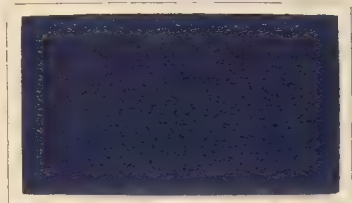
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34.



35.



36.



37.



38.

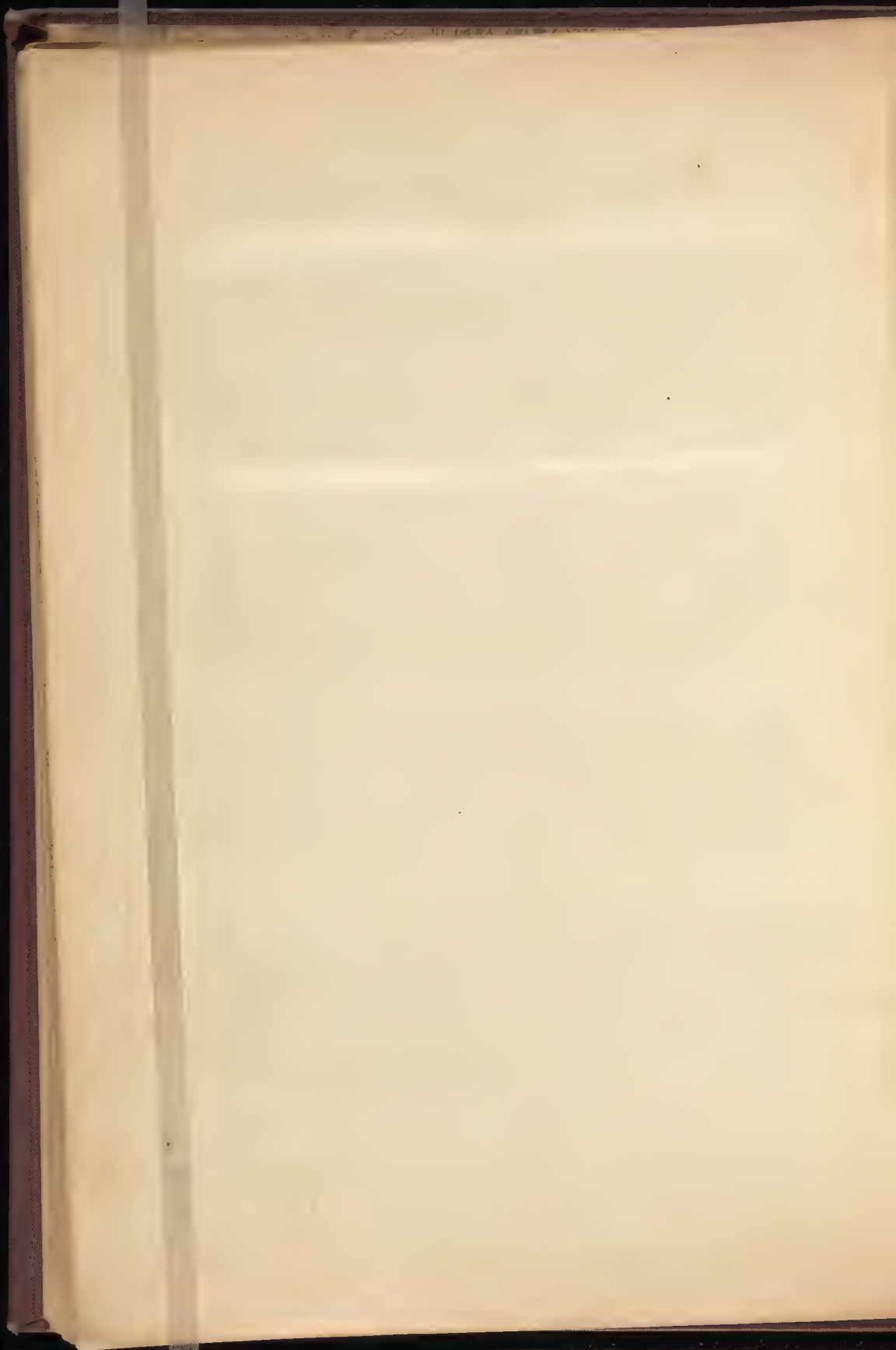


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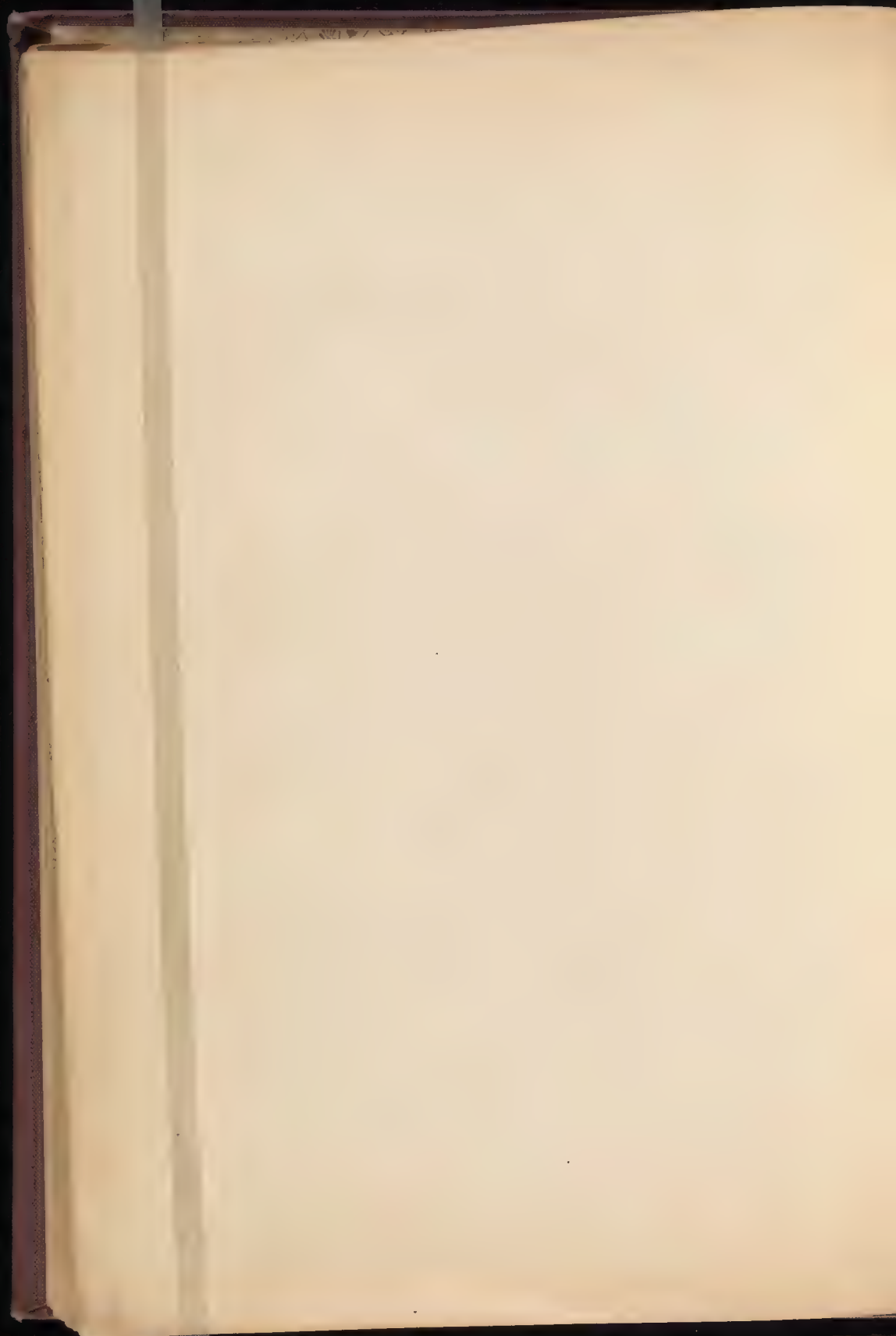
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Part III.

Dyeing of Cotton Yarn.



Part III.

The dyeing of Cotton Yarn (in open dye vessels).

In the chapter on the dyeing of loose cotton we generally discarded the after-treatment with metallic salts owing to the effect it has on the pliability of the fibre for spinning. As illustrated in Part I there is a larger selection of shades for yarn, owing to the fact that yarns can be after-treated.

Katigen Colours, especially for fast Blacks, have met with general favour and are extensively employed, which fact, considering the low cost for dyeing Aniline Oxydation Black, can only be attributed to the great advantages our Katigen Colours offer, viz. a larger selection of shades at equal depth of tone, the advantages of not tendering the fibre, the saving of the erection of the expensive Aniline Oxydation plant and the avoidance of the shade becoming green.

General Directions: The steam pipe, whether perforated or not should be so applied, that even for indirect steam, as large a heating surface as possible be secured, i. e. the pipe should run through the entire length of the dye vessel or still better should circulate all round the bottom of the vessel. As already mentioned on page 6, copper pipes should be avoided.

As a rule it is not absolutely necessary to previously boil the yarn, as the slight impurities of grease, oil, etc. contained in the yarn are easily removed in the strong hot alkaline dye liquor. As, however, standing baths, when employed for a long time, become very slimy and unfit for use, if greasy cotton is often dyed in same, the quality of the yarn should always be taken into consideration when dyeing.

If the yarns have to be previously boiled it is best to employ 4—6% soda; soap apart from its being dearer is not so well adapted for this purpose, as the residual soap or compounds of its decomposition may affect the colour dyeing up level.

Indirect steam is more advantageous in maintaining an invariable volume of dye liquor, and care should be taken when applying direct steam that it be of as high a pressure and as dry as possible when admitted to the dye bath, so as not to dilute the liquor too much.

I. Katigen Black SW, Katigen Blue Black B, Katigen Black 2B, Katigen Blue Black 4B and R on ordinary yarn.

As the Katigen Blacks dye easily level it is not always necessary to employ bent gas pipes (see Fig. 1), and therefore one need not dye immersed in the liquor, unless in special instances where the shades must be absolutely level or in cases when working with fine quality yarns.

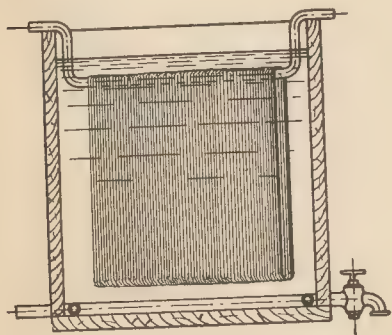


Fig. 1.

The directions for dyeing given hereafter are to be understood as applying to working with ordinary, viz. with straight sticks.

As regards the dimension of the dye vessel in comparison to the quantity of goods please refer to the general remarks on page 5.

Dyeing.

The following percentages of colour and chemicals, which vary according to the quality of the goods and the desired shade are to be understood for 100 lbs. yarn.

Volume of dye liquor 20:1 of goods.

	1st Bath	2nd Bath	3rd Bath	4th and standing Bath
Colour	18—25 lbs.	14½—20 lbs.	12½—17½ lbs.	10½—15 lbs.
Sulphide of soda crystals (or half the quantity concentrated)	18—25 "	12 —16 "	10 —13 "	8 —12 "
Soda ash	8 "	4 "	2 "	2 "
Glauber's salt crystals	40—60 "	20 —30 "	10 —15 "	5 —8 "
or common salt	18—27 "	9 —14 "	5 —7 "	2½—3½ "

Boil up sharply with the quantity of soda stated, and then if necessary remove the lime scum, afterwards during constant stirring add the colour solution, which has in the meantime been prepared by dissolving the colour with the quantity of sulphide of soda in 6—8 times the quantity of boiling water in a wooden bucket; the bath when boiled up sufficiently becomes perfectly clear, then add the salt, and boil up sharply

again for 8—10 mins., which must be done in order to secure level shades fast to rubbing. Shut off steam and enter the goods, turn the hanks 5 or 6 times successively and then afterwards each stick separately 6 or 7 times; the whole process of dyeing takes about 1 hour, and as a rule it is not necessary to turn on steam again. Care should be taken that the sticks are not too close together, as unlevel spots might thereby result.

Each hank is turned once again immediately before taking it out of the dye bath and is wrung out with two sticks or run through wooden squeezing rollers attached to the dye vessel. Enter the rinsing bath immediately after wringing out, and this first rinsing bath should be at a temperature of 85—105° Faht. and contain about 1—2% sulphide of soda crystals (on the weight of the goods). Turn the yarn 4 or 5 times in this rinsing bath and then finish rinsing in the ordinary way in fresh water (three baths are generally sufficient).

The first rinsing bath containing sulphide of soda can be made use of again, the percentage of sulphide of soda being then reduced, $\frac{1}{2}$ —1% being quite sufficient; this rinsing bath can then be used for replenishing the dye bath or for dissolving the dyestuff.

Katigen Black SW and Katigen Blue Black B, in many cases, do not require to be after-treated with metallic salts, but can be washed and dried at once if they have not to be scooped, topped or weighted. (See pages 9 and 10.) The other brands, however, generally require to be after-treated in order to obtain the most advantageous shades.

After-treating.

A. Ageing by air (steaming).

This method of after-treating is as a rule not so reliable and advantageous as the after-treating with metallic salts. The steaming is carried out in the same way as described under "Katigen Blacks on loose cotton": the yarn, however, after dyeing should not be hydro-extracted but rinsed in the ordinary way. To the last rinsing bath add about 4% caustic soda liquor 65—70° Tw., of the weight of the yarn, wring out uniformly and steam for about $\frac{3}{4}$ hour, then rinse again in 1 or 2 rinsing baths, hydro-extract and dry.

Another method is as follows: add to the dye bath about 2—4% caustic soda liquor 65—76° Tw. (the quantity of soda of course being correspondingly reduced) and when dyed wring out uniformly and steam before rinsing.

B. Developing with metallic salts,

Katigen Blue Black B is not much improved by an after-treatment with any of the metallic salts, but the following recipes have been found to give satisfactory results in dyeing Katigen Black SW in bulk:

I. $\left\{ \begin{array}{l} 2.25\% \text{ bichrome} \\ 3\% \text{ alum} \\ 2-5\% \text{ acetic acid} \end{array} \right.$

II. $\left\{ \begin{array}{l} 4\% \text{ bichrome} \\ 2-5\% \text{ acetic acid} \end{array} \right.$

When working according to method I a slightly bluish bloomy deep black shade and by method II a more reddish deep black is obtained.

In preparing the bath for after-treating add the acetic acid first, then the previously dissolved metallic salts and boil gently; turn off steam and enter the goods that have been previously well rinsed, and work for about 20 mins., then rinse thoroughly and to the last rinsing bath add 3—5 oz. soda or $\frac{1}{4}$ — $\frac{1}{2}$ pint ammonia per 10 gallons of liquor.

In order to obtain the proper shade of Katigen Black 2 B, Katigen Blue Black 4 B and R after-treat with:

$$\left\{ \begin{array}{l} 2.5\% \text{ bichrome} \\ 3.5\% \text{ copper sulphate} \\ 2-5\% \text{ acetic acid} \end{array} \right.$$

and work as above described. It has to be taken into consideration that for the above brands the addition of copper sulphate has the best effect for producing the proper bluish tone; bichrome alone or bichrome and alum produce duller and greener shades. The last rinsing bath after the developing process should also, as above described, be slightly alkaline.

The Katigen Blacks SW and B can of course also be employed for toning down the above mentioned Katigen colours, although for the SW and B, when dyed in self shades, other metallic salts are to be preferred.

We would particularly draw your attention to it, that the Katigen Black 2B, Katigen Blue Black 4B and R have a great tendency when stored to assume the bluish tone such as is obtained by steaming or after-treating with metallic salts, so that for pure black shades we would advise that the goods be not dyed direct (i. e. without any after-treatment); the goods should at least be subjected to a thorough oxydation: steaming, ageing, drying at low temperature, etc.

Should the yarn be brightened or weighted then the slightly alkaline after-treatment can be combined in some suitable way with this process.

The following Basic colours are especially adapted for brightening the Katigen Black brands, viz:

Turquoise Blue GG	Rhoduline Violet	Indon Blue BB
Methylene Blue BB	Methyl Violet 1 B	Auramine II*).

We would again mention that topping with not more than 0.1% basic colour impairs the fastness to washing but very little and the fastness to light is not at all affected.

If the shade has to be only slightly brightened then with a certain amount of care this can be done cold in the acetic acid bath by adding the dissolved basic colour in several portions.

In most cases it is more reliable to top or brighten with Basic colours in a hot soap bath, but it must be remembered that severely coppered goods

*) This colour is especially suited for toning down the reddish bronzy hue, should this be particularly desired; (vide paragraph on Katigen Black dyed on mercerised pieces) for the same purpose we also recommend treating reddish dyed yarns with 1.5% ammonia and 3% Turkey red oil at 105—120 Faht. for about 20 minutes.

thus treated have a very unpleasant smell when stored for a long time, if the soap is not entirely removed from the goods.

Warm up the bath containing 5⁰/₀ olive oil soap on the weight of the goods to 140—160° Faht. and each time after adding the portion of dissolved basic colour turn the yarn several times. If the shade has to be brightened but slightly then the colour solution can be added to the bath in one portion. As may be easily understood a larger amount of colour is required for the soap bath than when topping in the acetic acid bath, say about twice or three times as much, as more colour naturally remains in the bath, and for a medium brightening take about 0.1—0.3⁰/₀ Basic colour.

The goods are then rinsed well in soft water.

For particulars as to scrooping (to obtain a fine handle) as well as for weighting please refer to page 10 "General remarks."

2. The Dyeing of Katigen Black on mercerised yarn.

All the Katigen Blacks are suited for the dyeing of mercerised yarns, but for full deep shades the more greenish brands should be taken. For this reason Katigen Black TG, which is the greenest black brand, is mostly employed for this purpose; Katigen Black SW is occasionally after-treated with 2⁰/₀ bichrome and 3⁰/₀ copper sulphate or for deep direct dyed shades it is employed in combination with Katigen Green 2B or Katigen Olive GN.

A black of a remarkable bloomy and bluish tone can be obtained by after-treating Katigen Blue Black 4B as described above with 2⁰/₀ bichrome and 3⁰/₀ copper sulphate.

No particular precautions are necessary in dyeing mercerised yarns, except that the yarn should be well wetted out before entering the dye bath; it has also to be taken into consideration that much deeper and fuller shades are obtained on mercerised yarns with the same percentage of colour, ingredients, etc. for the first bath than on ordinary yarn; consequently for a given depth of shade the quantity of colour required for mercerised yarn can be reduced by a quarter the amount of colour necessary for ordinary yarns, e. g. 15⁰/₀ colour on mercerised yarn corresponds to 20⁰/₀ dyestuff on ordinary yarn; for standing baths, however, these proportions are naturally partly balanced, because as mentioned already the mercerised yarns exhaust the baths better.

A suitable cheap black can be obtained by working according to the following recipe:

Volume of dye liquor 20:1 of goods	1st Bath.	Standing Bath.
Katigen Black SW	13 ⁰ / ₀	8.5 ⁰ / ₀
Sulphide of soda crystals (or $\frac{1}{3}$ the quantity concentrated)	12 ⁰ / ₀	7 ⁰ / ₀
Soda ash	8 ⁰ / ₀	2 ⁰ / ₀
Glauber's salt crystals	40 ⁰ / ₀	5 ⁰ / ₀
or Common salt	18 ⁰ / ₀	2 ⁰ / ₀

Dye and rinse as usual, then after-treat with

2% bichrome,
3% copper sulphate,
2—5% acetic acid.

Scrooping of mercerised yarn: In dyeing mercerised yarns it is not only necessary that the original lustre be retained, but that the yarn have a rustling handle similar to that of scrooped silk, which can be obtained on mercerised yarn, the same as on natural silk, by the following recipes which have been found to give satisfactory results:

1. Scroop the yarn, as soon as finally rinsed, with $1\frac{1}{2}$ —2% tartaric acid and 3% acetic acid 8° Tw. at the ordinary temperature, volume of dye liquor 20:1 of goods; work for $\frac{1}{4}$ hour, wring out uniformly and dry without any previous rinsing.

2. The scrooping should be done in two baths, first by working the dyed or after-treated and rinsed yarn in a luke warm soap solution (4—5 oz. soap per gallon) and when slightly wrung out pass the goods through a cold acetic acid bath, containing about 1— $1\frac{1}{4}$ oz. per gallon; work the yarn for 10 mins, wring out and dry without any previous rinsing. The scroop obtained by the above method is produced by the precipitated fatty acids and it is therefore necessary to employ as hard a soap as possible, best of all pure stearine soap.

The scroop obtained by either of the above methods described is permanent: one can also scroop with acetic acid (4—5% of the weight of the goods), but such a scroop is weaker and does not last so long.

For reasons hitherto unexplained it happens sometimes (especially with goods that have been after-treated with bichrome and copper sulphate) that the yarn has to be subjected to the above described process a second time before the proper scroop is obtained.

3. Katigen Black as a bottom for ordinary Aniline Black.

Mention has already been made in a preceding chapter that Katigen Colours serve as a kind of mordant for fixing Basic Colours, and the Katigen Black brands, when employed as a bottom for ordinary Aniline Black, have similar properties; of course for this purpose only the cheap brand SW comes into consideration. Goods dyed with a comparatively small percentage of Katigen Black SW and afterwards rinsed thoroughly before entering the ordinary Aniline Black bath exhaust the latter bath completely, in other words, the Katigen Black serves as a mordant for the intermediate processes for Aniline Black and fixes the latter completely on the fibre, without sustaining a loss of the formation of the Aniline Black in the bath:

Proceed as follows: 1st Bath

Dye with 8—10% Katigen Black SW,
 8% sulphide of soda cryst.
 (or half the amount calcined.),
 4% soda ash,
 40% Glauber's salt, cryst.,
 or 18% common salt

rinse thoroughly in the usual way, and enter the Aniline Black bath cold (volume of dye liquor 20:1 of goods) prepared as follows:

3 lbs. Aniline Salt,
 or { 2 lbs. 2 oz. Aniline oil dissolved in
 1½ pints hydrochloric acid 32° Tw.,
 2½ pints sulphuric acid 142° Tw.,
 4 lbs. bichrome,
 2 lbs. copper sulphate.

Raise the temperature of this bath within ½ hour to 120—140° Faht. whilst constantly working the yarn; in the next half hour the temperature can be brought up to 140—150° Faht. and the formation of the Aniline Black is completed within the next ½ hour; rinse well, and to the last rinsing bath add ⅓—½ oz. soda per gallon liquor.

The deep black shade thus obtained corresponds to a shade dyed with about 22% of Katigen Black SW in the first bath, and is of course possessed of excellent fastness.

4. Katigen Indigo B extra, R extra. (Katigen Chrome Blue 2R, 5G.)

From the characteristic properties of both the Katigen Indigo brands already described in Part I the application and adaptability of these colours are clearly evident. They are therefore to be employed in cases where the fastness of the Diazotisable colours, such as Diazo Indigo Blue or colours that are afterwards treated with copper, is not found sufficiently good, and where a blue shade is desired that is at least of the same good properties as Indigo itself, and that in its properties and price as well as method of application offers a decided advantage to Indigo.

The directions stated for dyeing Katigen Black on cotton yarn apply in general to Katigen Indigo B extra and R extra, Katigen Chrome Blue 2R and 5G as well as to the different combinations of these colours, and we therefore may confine ourselves in the following recipes in merely describing the methods of working that differ from that of Katigen Black; full particulars will otherwise be found on page 44-46.

As the method of working and selection of products adapted for the various suitable and popular blue shades on yarns are different in each separate case we shall deal with these explicitly in each individual instance, the same as we have already done for loose cotton.

a) Reddish Light Blue.

Volume of dye liquor 20:1 of goods	1st Bath	Standing Bath
Katigen Indigo B extra or R extra	1 $\frac{1}{2}$ $\frac{0}{10}$	1 $\frac{1}{2}$ $\frac{0}{10}$
Sulphide of soda crystals	3 $\frac{0}{10}$	3 $\frac{0}{10}$
Soda ash	5 $\frac{0}{10}$	1 $\frac{0}{10}$
Salt	—	—
Turkey Red Oil	2 $\frac{0}{10}$	1 $\frac{0}{10}$

Dye and after-treat with:

1 $\frac{0}{10}$ bichrome,
2 $\frac{0}{10}$ copper sulphate,
2—5 $\frac{0}{10}$ acetic acid.

Dye and after-treat in the same way as stated for Katigen Black; it is not absolutely necessary to rinse with the addition of sulphide of soda after dyeing. Instead of after-treating with metallic salts one can steam for a short time.

b) Light Indigo Shades.

Volume of dye liquor 20:1 of goods	1st Bath	Standing Bath
Katigen Indigo B extra	2 $\frac{1}{2}$ $\frac{0}{10}$	2 $\frac{1}{2}$ $\frac{0}{10}$
Katigen Chrome Blue 5G	2 $\frac{0}{10}$	2 $\frac{0}{10}$
Sulphide of soda crystals	6 $\frac{0}{10}$	5 $\frac{0}{10}$
Soda ash	5 $\frac{0}{10}$	1 $\frac{0}{10}$
Salt	—	—
Turkey Red Oil	2 $\frac{0}{10}$	1 $\frac{0}{10}$

Dye and after-treat in the same way as described above under a) (Reddish Light Blue). For greenish blue shades the R quality is of course less adapted.

c) Reddish Bright Medium Blue.

Volume of dye liquor 20:1 of goods	1st Bath	Standing Bath
Katigen Indigo B extra or R extra	6 $\frac{0}{10}$	3-6 $\frac{0}{10}$
Sulphide of soda crystals	12 $\frac{0}{10}$	4 $\frac{0}{10}$
Soda ash	6 $\frac{0}{10}$	2 $\frac{0}{10}$
Salt	—	—

The dyeing of such shades where particularly level shades are desired, can be done as a rule best on bent pipes as the yarns are under the surface of the liquor all the time during the dyeing process. Add to the first rinsing bath, which should be about 100° Faht., a slight amount of sulphide of soda, same as mentioned for Katigen Black, and then rinse thoroughly in fresh water; the after-treatment can be done according to either of the following three recipes:

- I. 2⁰/₁₀ bichrome, II. 2⁰/₁₀ bichrome, III. 3⁰/₁₀ sulphate of zinc,
 3—4⁰/₁₀ copper sulphate, 3⁰/₁₀ alum, 2—5⁰/₁₀ acetic acid.
 2—5⁰/₁₀ acetic acid. 2—4⁰/₁₀ acetic acid.

The clearest and reddest shades are obtained according to Recipe I, whereas with II and III duller and greener shades are obtained, which, however, are remarkably fast to boiling alkali and soap baths. The after-treatment with sulphate of zinc is much cheaper than when working with chrome and copper, but care must be taken not to after-treat Katigen Indigo B extra and R extra when dyed in combination with Katigen Chrome Blues or Katigen Blue Blacks, with this salt, as all these dyestuffs then only assume a poor greenish shade.

The rinsing after dyeing should be done very carefully and thoroughly, as otherwise the full effect of the metallic salts in the after-treatment is not obtained. For security's sake Recipe I can be carried out as follows: Boil up the bath first with the necessary quantity of acetic acid and $\frac{1}{2}$ ⁰/₁₀ bichrome, then turn off steam, enter the goods, work for 25 mins. and lift; the quantity of bichrome and copper sulphate stated can now be added, and then continue working in the usual way.

d) Medium Indigo Blue.

The following recipes can be employed, according to the desired shade, for a greenish tone Recipe I and for a reddish tone Recipe II.

I.			2.		
Volume of dye liquor 20:1 of goods	1st Bath	Stand- ing Bath	Volume of dye liquor 20:1 of goods	1st Bath	Stand- ing Bath
Katigen Indigo B extra .	1 ⁰ / ₁₀	$\frac{7}{10}$ ⁰ / ₁₀	Katigen Indigo B extra .	3 ⁰ / ₁₀	2.1 ⁰ / ₁₀
Katigen Blue Black 4B .	8 ⁰ / ₁₀	5 ⁰ / ₁₀	Katigen Blue Black R. .	3 ⁰ / ₁₀	1.8 ⁰ / ₁₀
Sulphide of soda crystals .	10 ⁰ / ₁₀	5 ⁰ / ₁₀	Sulphide of soda crystals .	9 ⁰ / ₁₀	4 ⁰ / ₁₀
Soda ash	8 ⁰ / ₁₀	2 ⁰ / ₁₀	Soda ash	8 ⁰ / ₁₀	2 ⁰ / ₁₀
Glauber's salt crystals . .	15 ⁰ / ₁₀	1 $\frac{1}{2}$ ⁰ / ₁₀	Glauber's salt crystals . .	5 ⁰ / ₁₀	$\frac{1}{2}$ ⁰ / ₁₀
(Common salt half the amount)			(Common salt half the amount)		

In both cases it is necessary to after-treat with bichrome and copper sulphate, further directions for manipulation will be found above in paragraph c).

e) Reddish Navy Blue.

The self shade of Katigen Indigo R extra after-treated with bichrome and copper sulphate yields a fine dark Indigo tone of great brightness of shade. Similar shades can be produced with Katigen Indigo B extra in combination with Katigen Blue Black R or Katigen Chrome Blue 2R. The coppery tone down hand, which is peculiar in dark indigo shades, can be obtained by topping with about 0.1⁰/₁₀ Indon Blue RR.

The following directions will be found useful, and for the shade we refer you to the patterns on pages 81—83.

I.

Volume of dye liquor 20:1 of goods	1st Bath	Stand- ing Bath
Katigen Indigo R extra	10 0/10	6 0/10
Sulphide of soda crystals	20 0/10	8 0/10
Soda ash	8 0/10	2 0/10
Glauber's salt crystals	10 0/10	1 0/10
(Common salt half the amount)		

Volume of dye liquor 20:1 of goods	1st Bath	Stand- ing Bath
Katigen Indigo B extra	9 0/10	5 4 0/10
Katigen Chrome Blue 2R	5 0/10	3 0 0
Sulphide of soda crystals	20 0/10	10 0 0
Soda ash	8 0/10	2 0 0
Glauber's salt crystals	5 0/10	1 1/2 0/10
(Common salt half the amount)		

Katigen Indigo R extra even when dyed on straight sticks produces very level shades; should extremely level shades be demanded it is then perhaps advisable to dye without any addition of salt or on bent gas pipes. Katigen Indigo B extra dyed a self shade, or when employed as the principal constituent of a combination, always produces better results for reddish navy blues when dyed on bent gas pipes. For both of the above recipes the after-treatment with bichrome and copper sulphate is the most convenient and suitable. Katigen Indigo B extra and R extra dyed a self shade produce reddish blue shades also when steamed; it should be born in mind, however, that this process cannot be employed when Katigen Chrome Blues or Katigen Blue Blacks are used in combination, as the resulting shade is then too green and dull.

For mercerised yarns all that has been said under Katigen Blacks equally applies for all the above recipes.

5. Katigen Black Brown N, Katigen Brown V extra, Katigen Yellow Brown GG and Katigen Chrome Brown 5 G.

Katigen Black Brown N produces a rather full black brown shade when working according to the following proportions.

For 100 lbs yarn. — Volume of dye liquor 20:1 of goods.

	1st Bath	2nd Bath	3rd Bath	4th and stand- ing Bath
Katigen Black Brown N	25 30 lbs.	20-24 lbs.	17-21 lbs.	14 1/2 - 18 lbs.
Sulphide of soda crystals (or half the amount concentrated).	4-5 lbs.	2-3 lbs.	1-2 lbs.	3/4 - 1 lb.
Soda ash	8 "	4 "	2 "	2 lbs.
Glauber's salt crystals	80 "	40 "	20 "	10 1/2 "
or Common salt	36 "	18 "	9 "	4 1/2 "

Boil up the hot dye liquor in the usual way with the addition of soda and if necessary skim off the lime froth; then add the colour, which has in the meantime been dissolved with the requisite quantity of sulphide of soda in boiling water, then boil up again for a short time and add the salt; boil up once more, then shut off steam, enter the goods and dye for 1 hour without further access of steam, after which rinse well.

Katigen Black Brown can under circumstances be dyed cold; enter the yarn into the warm dye liquor prepared as above described and allow to

remain in same over night. By a respective concentration of the dye liquor and by working at 105—120° Faht. a deep black brown shade can be obtained in 1 hour.

Although no remarkable effect is produced when after-treating Katigen Black Brown with metallic salts, it must nevertheless be taken into consideration that by storing for a long time the shade assumes a redder and more bloomy tone, which effect can be produced direct by entering the dyed yarn, after it has been rinsed, into a warm bath at 110—120° Faht. containing

1—3 oz. copper sulphate and } per gallon dye liquor
 1—3 " bichrome }
 2—5 0/10 acetic acid

or for 100 lbs. yarn (volume of dye liquor 20:1 of goods)

4 lbs. copper sulphate,
 4 lbs. bichrome,
 3—7½ pints acetic acid

and work for ¼ hour; this bath can be used for further lots, when it is then necessary to add only

1 lb. copper sulphate }
 1 lb. bichrome } per 100 lbs. goods.
 ½—¾ pint acetic acid }

This after-treatment is of more importance in dyeing mode or art shades with Katigen Colours, which will be discussed in a subsequent chapter.

For Katigen Yellow Brown GG and Katigen Chrome Brown 5 G the following proportions are applicable:

For 100 lbs. goods — volume of dye liquor 20:1 of goods. Medium Yellow Brown (Katigen Yellow Brown GG) old Gold Shade (Katigen Chrome Brown 5 G after-treated):

Volume of dye liquor 20:1 of goods	1st Bath	Standing Bath*)
Colour	15 lbs.	9 lbs.
Sulphide of soda crystals	3 "	½ "
Soda ash	8 "	2 "
Glauber's salt crystals	60 "	6 "
or Common salt	27 "	2½ "

Dye and rinse in the same way as described for Katigen Black Brown N. The direct dyed shades of Katigen Yellow Brown GG, Katigen Chrome Brown 5 G need no after-treatment, but in order to increase their fastness to light after-treat with:

2 0/10 bichrome }
 3 0/10 copper sulphate } of the weight of the yarn.
 2—5 0/10 acetic acid }

*) The percentages for standing baths have been calculated on a sliding scale with two intermediate baths.

6. Katigen Green 2B, Katigen Olive G, GN, Katigen Chrome Blue 5G.

For a full Green, medium Olive and full bluish Green the following proportions are to be observed.

For 100 lbs. goods. — Volume of dye liquor 20:1 of goods.

	1st Bath	Standing Bath*)
	10 lbs.	6 lbs.
Colour	2 "	$\frac{1}{2}$ "
Sulphide of soda crystals	8 "	2 "
Soda ash	40 "	5 "
Glauber's salt crystals	18 "	$2\frac{1}{4}$ "
or Common salt		

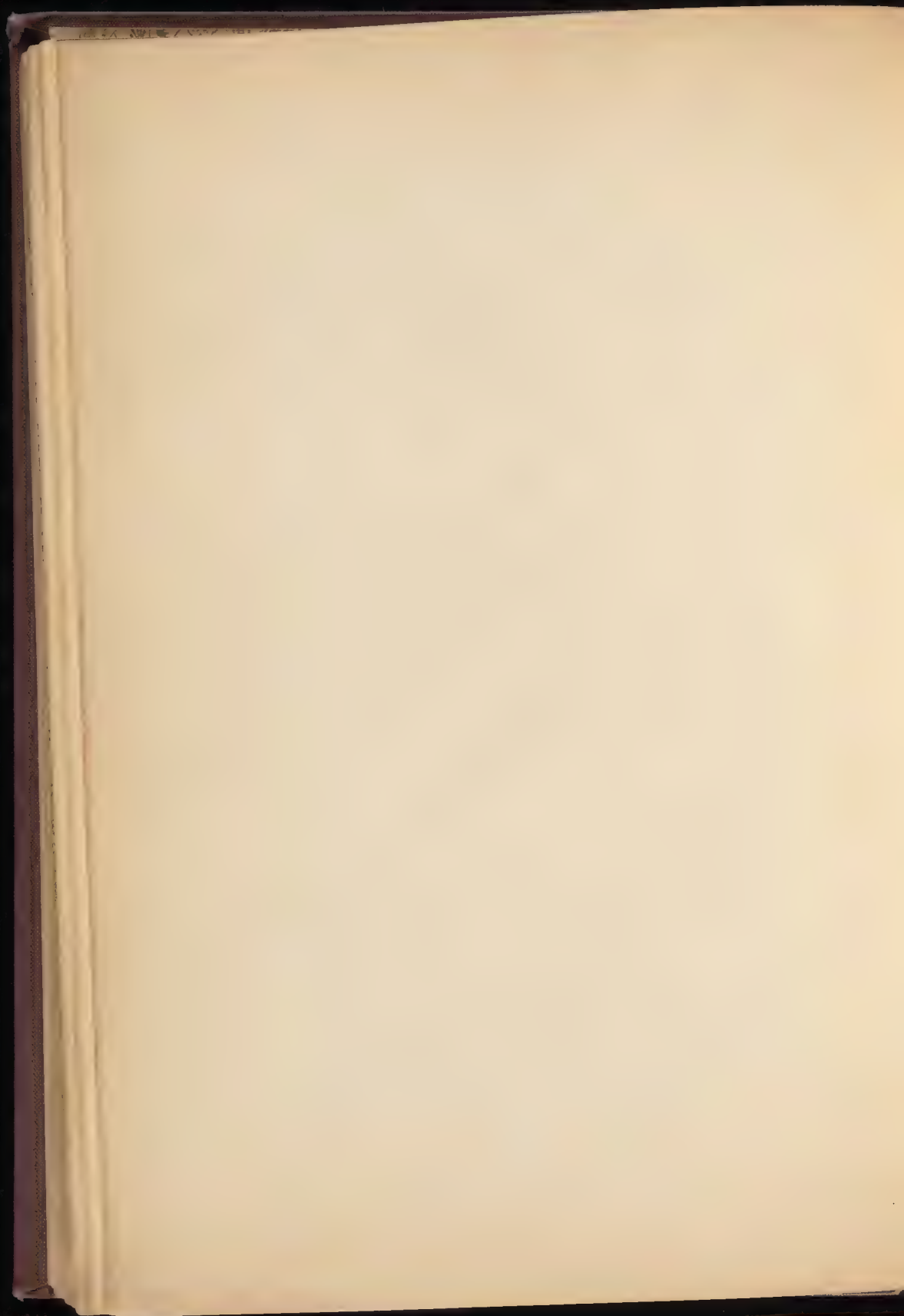
Proceed in exactly the same way as already described for Katigen Black Brown. Katigen Green 2B and Katigen Olive G and GN can be dried at once without any after-treatment at all, but in order to obtain a proper bluish green shade with Katigen Chrome Blue 5G, which by the bye dyes a slightly more bluish green than the Katigen Green 2B, it is necessary to after-treat with bichrome and copper sulphate, which is done in the same way as for Katigen Chrome Brown 5G.

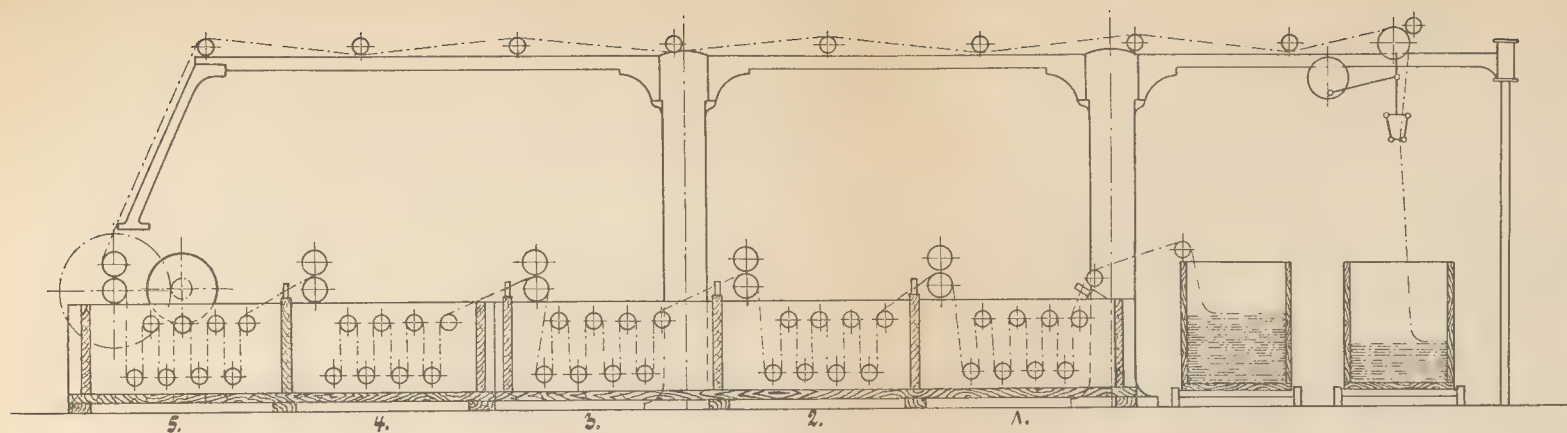
The Browns and Yellow Brown brands as well as the Olives and Greens can without any hesitation be brightened with a small percentage (say 0.05—0.1 %) of Basic Colour in the same way as described for the Katigen Blacks. What has already been said as regards the quantity of dyestuff for the first bath in dyeing mercerised yarns or for scooping same equally applies here. Katigen Olive, Katigen Green and Katigen Chrome Blue 5G dyed on mercerised yarns yield extraordinary clear shades, which are very much in demand, and the original lustre is not impaired by the dye process. Katigen Brown V extra when scooped with strong acids becomes bluer in shade, which should be taken into consideration when dyeing mercerised yarns.

*) For standing baths, take 2 intermediate baths, the same as with Katigen Black Brown N.

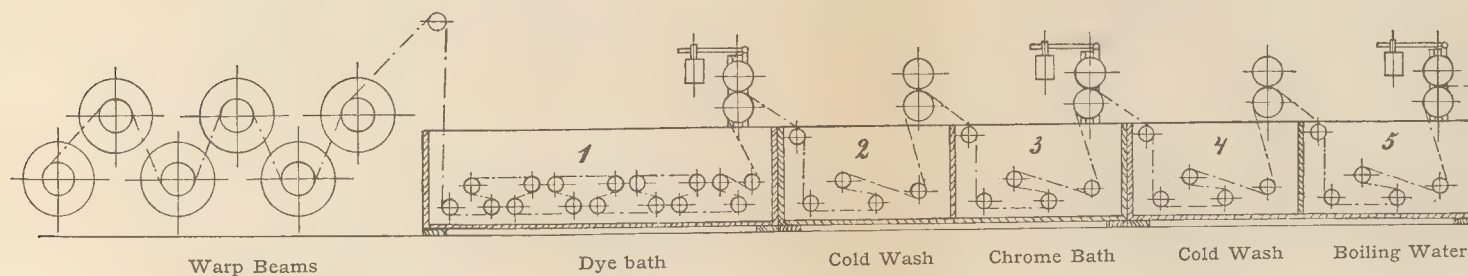
Part IV.

The Dyeing of Cotton Warps.





Continuous Warp Dyeing Machine I.



Warp Beams

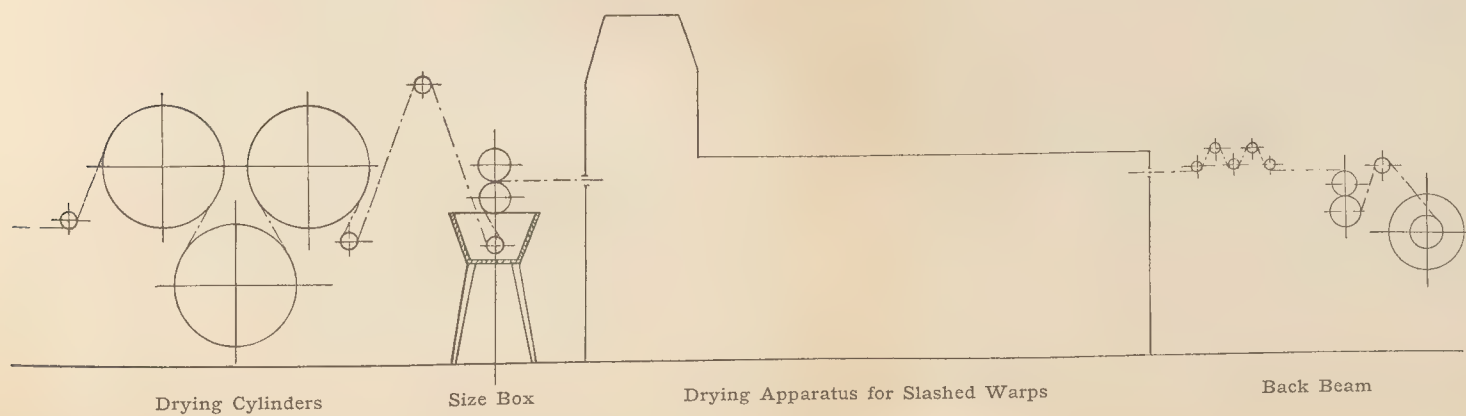
Dye bath

Cold Wash

Chrome Bath

Cold Wash

Boiling Water



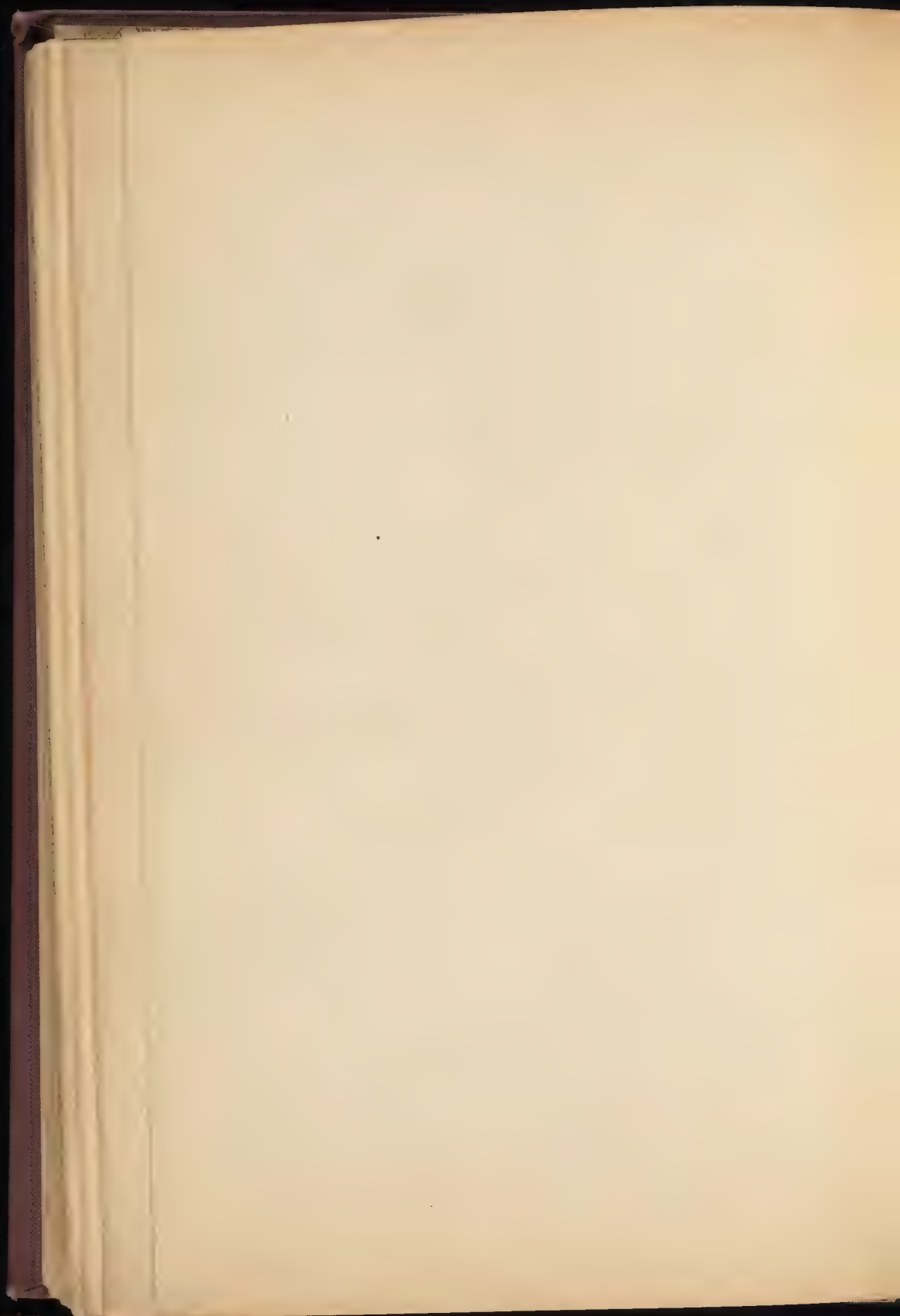
Drying Cylinders

Size Box

Drying Apparatus for Slashed Warps

Back Beam

Continuous Warp Dyeing and Slashing Machine II.



Part IV.

The Dyeing of Cotton Warps.

1. Katigen Black SW, Katigen Blue Black B, Katigen Black 2B, Katigen Blue Black 4B and R.

In warp dyeing a minute difference in the shade is not of great importance, so that in most cases such Katigen Blacks can be employed that produce a deep black or bluish black without any after-treatment.

For the production of a cheap deep black, especially where only simple appliances are at disposal, Katigen Black SW dyed direct without any after-treatment will be found the best suited, and Katigen Blue Black B, without being after-treated, is the best adapted for full bluish blacks. When the after-treatment, however, can be easily carried out Katigen Black SW after-treated with bichrome and alum should be employed for slightly bluish deep black shades, and for still bluer tones Katigen Black 2 B after-treated with bichrome and copper sulphate can be taken.

As already mentioned in the chapter on the stability of the fibre when dyed with Katigen Colours see page 10, there is no possibility of Katigen Colours deteriorating the fibre, as is often the case with goods dyed by oxydation or by the one dip Aniline Black process, provided that the goods have not been after-treated with metallic salts.

In order to prevent a possible deterioration of the fibre or in the event that goods containing such dyed warps will be subjected to a severe steaming or very hot ironing, it is sufficient in order to counteract the effect of the metallic salts to run the warps through a slightly alkaline liquor, which can be done either in the rinsing or slashing bath, containing soda, ammonia, etc.

The manifold mechanical appliances for warp dyeing necessitate an alteration in the different recipes for preparing the dye bath. The quantity of colour necessary for the production of a given shade must be calculated according to the volume of dye liquor, viz. so much colour per gallon and not according to the weight of the goods, as, the warps only being in the dye liquor for a comparatively short time, satisfactory results are dependent upon the concentration of the dye liquor.

In warp dyeing especially, only the percentages employed in standing baths can be taken as a base for ascertaining the actual cost price of dyeing.

The shorter the duration of dyeing, i. e. the quicker the warp passes through the dye bath, the larger are the quantities of colour necessary for the first bath; should the warps, however, run through the dye liquor several times then a correspondingly smaller amount of colour should be employed for the first end. From the above it is therefore conclusive that for standing baths, in cases where the warps are run quickly through the liquor, a comparatively less percentage of colour is required for the following ends; when running the warps several times through the liquor the quantity of colour taken up by the warps is greater and must therefore be replenished accordingly.

On observing the remarks above the following recipes for the various methods of warp dyeing will be easily understood.

a) Dyeing of warps on the winch.

This method of warp dyeing, in which the goods are in the dye liquor itself for a long time, closely approaches the method of yarn dyeing in the vat which has already been described, and as the volume of dye liquor is the same or still more advantageous here than in yarn dyeing, the percentages given on page 22 for 1st and standing baths can safely be employed for warps.

Enter the warp at the boil, give 2 or 3 ends and run the warps for another 5 or 6 ends without any addition of steam to the dye bath; then squeeze out in the proper way so that all superfluous dye liquor is removed from the warps and afterwards rinse thoroughly.

In case the warps have to be after-treated this can be done in the same way as already described for yarn dyeing.

b) Continuous Warp Dyeing Machine I.

The continuous warp dyeing machine, as can be seen from the following illustration, consists of 5 compartments, which can also be employed for the after-treatment of the warps with metallic salts, and the course the warps take as well as the squeezing and guide rollers can also be seen from the same illustration. Compartments 1 and 2 contain the colour solution, compartment 3 is for continuous rinsing with water, compartment 4 contains the metallic salts and acetic acid, and compartment 5 like compartment 3 is for rinsing again. Per gallon liquor employ:

	1st Bath	2nd Bath	3rd Bath	4th Bath
Katigen Black SW or Katigen Black 2B.	$4\frac{3}{4}-7\frac{1}{4}$ oz.	$2\frac{1}{2}-3\frac{1}{2}$ oz.	$1\frac{1}{2}-2$ oz.	$1\frac{1}{4}-1\frac{1}{2}$ oz.
Sulphide of soda crystals (or half the amount concentrated)	$4\frac{3}{4}-7\frac{1}{4}$ "	$2\frac{1}{2}-3\frac{1}{4}$ "	$1\frac{1}{2}-1\frac{3}{4}$ "	$1-1\frac{1}{3}$ "
Soda ash	$\frac{1}{3}-\frac{1}{2}$ "	$\frac{1}{6}-\frac{1}{3}$ "	$\frac{1}{12}-\frac{1}{6}$ "	$\frac{1}{18}-\frac{1}{12}$ "
Glauber's salt (Common salt half the amount)	$2\frac{1}{2}-3$ "	$1\frac{1}{4}-1\frac{1}{2}$ "	$1\frac{1}{8}-1\frac{1}{2}$ "	$1\frac{1}{8}-1\frac{1}{2}$ "

Add the soda ash to compartments 1 and 2 in equal proportions and then boil up, and to each of these compartments add $\frac{1}{3}$ of the colour solution, which has been prepared by dissolving the colour in boiling water along with the sulphide of soda in a bucket; $\frac{2}{3}$ rds of the dissolved Glauber's salt are also added to compartments 1 and 2 in equal proportions; after boiling up for some time start the warps running and steam should be turned on just sufficient to keep the liquor simmering. The last third of the colour solution and Glauber's salt are added slowly according to the running of the warps.

For Katigen Black SW and Katigen Blue Black B, which as a rule do not need to be after-treated, the compartments 3—5 are used as rinsing baths, in which case of course the quantity of water in each compartment is less than when rinsing in one compartment only.

When after-treating Katigen Black SW compartment 3 is used for rinsing the warps thoroughly and in compartment 4 after-treat at a temperature of $175-195^{\circ}$ Faht. with:

$$\left. \begin{array}{l} 2\% \text{ bichrome} \\ 3\% \text{ alum} \\ 3-5\% \text{ acetic acid} \end{array} \right\} \text{ of the weight of the warps}$$

and in compartment 5 the warps are again rinsed thoroughly.

For Katigen Black 2B and the Katigen Blue Black brands instead of the above ingredients employ:

$$\left. \begin{array}{l} 2\% \text{ bichrome} \\ 3\% \text{ copper sulphate} \\ 3-5\% \text{ acetic acid} \end{array} \right\} \text{ of the weight of the warps.}$$

c) Continuous warp dyeing machine II with a slashing machine attached.

The method of working will be seen from the illustration of Machine II.

Prepare the dye bath and bath for after-treating in the same way as described above; care should be taken that the first addition of colour and Glauber's salt be in proportion to the weight of the warps and the speed they are run through the liquor, and add the remaining portions in a corresponding manner.

d) Dyeing of Warps on the Beam.

As the directions for dyeing warps on the beam are similar to those for machine dyeing this method of dyeing will be described in Part V (Machine dyeing).

2. Katigen Black Brown N on Warps.

Katigen Black Brown N, owing to the very low cost of dyeing suitable shades with it, has found employment in various branches of warp dyeing.

For medium and dark brown shades the proportions are as follows:

1st Bath.

Katigen Black Brown N	$6\frac{1}{2}$ - $9\frac{1}{2}$ oz.	} per 1 gallon dye liquor
Sulphide of soda crystals (or half the amount concentrated)	1 - $1\frac{1}{2}$ "	
Soda ash	$\frac{1}{6}$ - $\frac{1}{3}$ "	
Glauber's salt crystals (Common salt half the amount) . .	3 - $4\frac{3}{4}$ "	

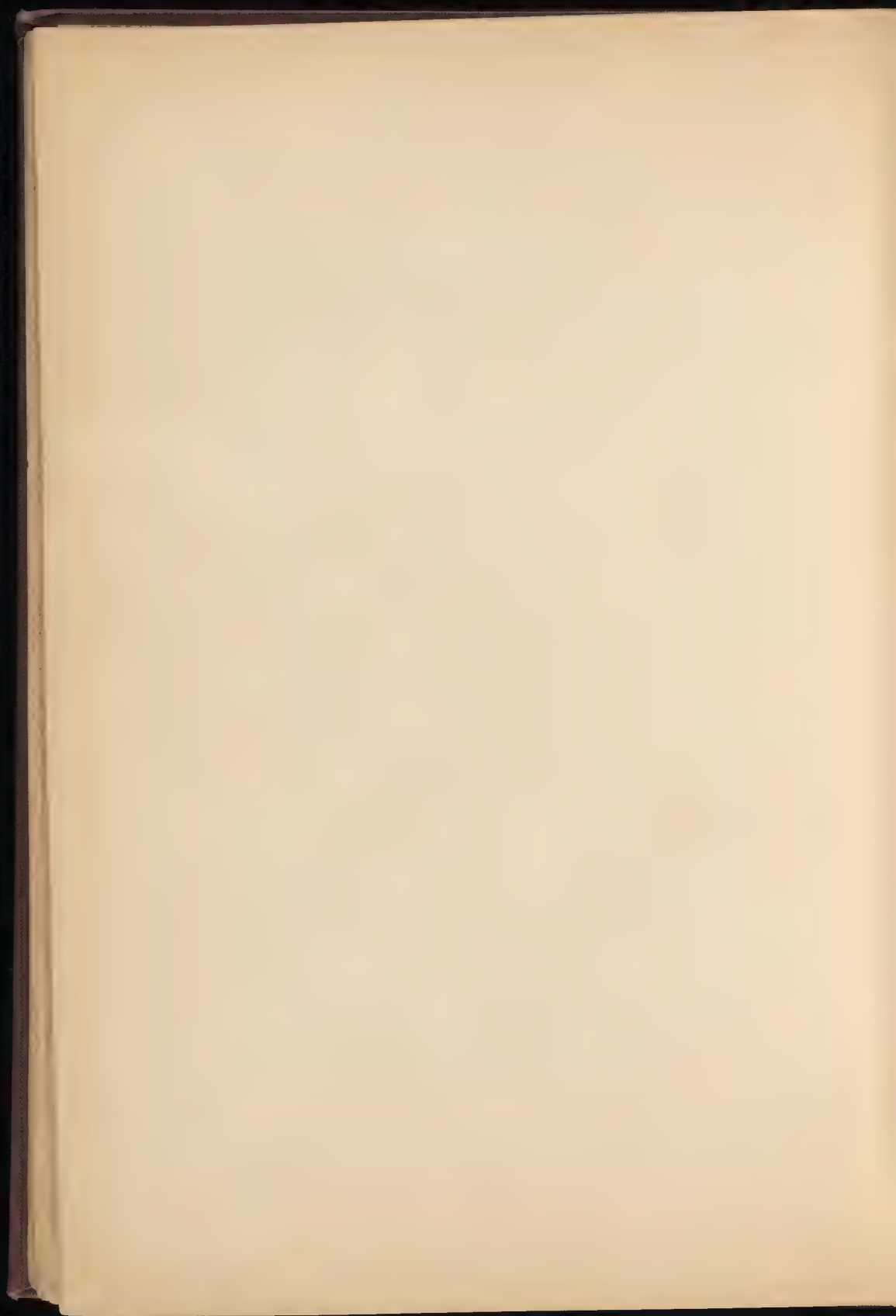
Standing Bath.

Katigen Black Brown N	15 - $20\frac{9}{10}$	} of the weight of the warps
Sulphide of soda crystals (or half the amount concentrated)	1 - 2 "	
Soda ash	1 - 2 "	
Glauber's salt crystals (Common salt half the amount) . .	7 - 10 "	

3. Katigen Indigo B extra, R extra and Katigen Chrome Blue 2R on warps.

The method of employing Katigen Indigo brands, whether dyed as self shades or in combination with the colours above mentioned, depends entirely upon the machines used: for dyeing on the winch the recipe given for yarn dyeing can be adopted without hesitation; for the continuous warp dyeing machines we recommend Katigen Indigo R extra dyed either a self shade or in combination with Katigen Chrome Blue 2R, 5G, Katigen Blue Black 4B or R, as it is easily soluble and can be dyed in a very short liquor. When not too large a percentage of Katigen Blue Black or Katigen Chrome Blue 2R is employed it is best to work without any addition of salt at all. Which product is best adapted for a certain shade can be seen at a glance from our remarks under the dyeing of Katigen Indigo on hanks.

Part V.
Dyeing in Machines.



Part V.

Dyeing in Machines. (Roving, Slivers, Cheeses, Cops and Warps).

The extensive and general application of the Katigen Colours during their comparatively short existence has been greatly assisted by the evident and economical advantages of machine dyeing, and a number of suitable machines have been brought out for the dyeing of these peculiar colours, and all the various machines have been so constructed as to be especially adapted for the respective purpose.

The essential point of machine dyeing, apart from the method of application and the colours employed, consists in strictly adhering to the following fundamental rules.

1. The water for dyeing should be as soft as possible (condensed water), and even for rinsing and after-treating soft water is of great advantage.

2. All the ingredients as well as dyestuff should be thoroughly dissolved in the dye liquor and filtered or sieved, as even slight quantities of suspended colour particles as well as all kinds of precipitates, which for instance when dyeing in the ordinary dye vessel are of scarcely any consequence, will be retained by the goods, which act as a filter, thereby producing spotted shades which rub off.

3. For machines in which the goods are packed together closely an after-treatment with metallic salts is generally not of any avail, as the slightest amount of alkali or sulphide still retained in the goods neutralises the effect of the metallic salts, causing a precipitate to form which can only be removed with great difficulty.

4. Compressed air should not be used for such machines in which the dye liquor is pressed and drawn through by suction but steam pressure should always be employed.

5. All the parts of the machine that come into contact with the dye liquor should be made of iron or should be well nickled or tin plated.

As in machine dyeing a short liquor is mostly employed, deeper and fuller shades are as a rule obtained even when employing the small quantity of salt stated in the recipe below.

A. Loose Cotton, Roving and Sliver

1. Katigen Black.

In all the stages previous to the spinning of the cotton a slight unevenness of the shade is of minor importance, as the unevenness of the shade is counteracted by the spinning process. Care should, however, be taken that the colour does not crock off, which can be avoided by employing soft water, and, as already mentioned in the introductory part of this chapter, by boiling up well after the salt has been added to the dye-bath.

	1st Bath	Standing Bath
Colour	18—30%	11—18%
Sulphide of soda crystals (half the amount concentrated)	18—30%	6—10%
Soda ash	6—8%	2—3%
Glauber's salt crystals (Common salt half the amount)	15—25%	2—4%
Turkey red oil	2—3%	$\frac{1}{4}$ — $\frac{1}{2}$ %

For standing baths take 1 or 2 intermediate baths before employing the percentages stated for same.

Method of Dyeing. Boil up with soda and Turkey red oil, then skim off carefully, add the colour solution, which has been previously prepared by dissolving well with the addition of sulphide of soda, boil up for a short time, then add the salt (always Glauber's salt, unless there are reasons for not doing so) and boil up again for 8—10 mins. before entering the goods; during the dye process boil slightly at intervals.

The duration of dyeing in machines is shorter than when working in the ordinary dye vessels, the time required being about $\frac{1}{2}$ hour. The dye liquor is drawn off after dyeing into the reservoir and clear water is run into the machine, which is then set in motion for a few minutes. By this strong alkaline rinsing the goods are thoroughly cleaned and at the same time the dyestuff is made the most use of, as in most machines this rinsing liquor is run into the colour solution without the volume of dye liquor becoming too large for subsequent baths.

The goods are afterwards rinsed, and in cases where the water supply is limited the same effect can be obtained by a less quantity of water, provided that the machine is set in motion for a few minutes each time a fresh quantity of water has been added, and in many instances this method of working is to be preferred to the continuous rinsing baths.

Unspun goods are as a rule not afterwards treated with metallic salts, as the cotton becomes more or less harsh, and the higher the percentage of metallic salts employed the harsher the cotton becomes. Small quantities of metallic salts can generally be employed without any hesitation for about 20 mins. at 100—120° Faht. as for instance in dyeing mode or art shades. The method of after-treatment generally necessary for Blacks and Blues is

only admissible in cases where the spinner can oil the goods well, (such as in spinning half-wool and very soft yarns), and the opinion of the spinner should at all events be gathered before subjecting the goods to any such after-treatment.

The only method of after-treatment that is applicable in all cases is the ageing by air.

Method of working. Add to the first rinsing bath $1\frac{1}{2}$ —3% caustic soda liquor (60—75° Tw.) (of the weight of the goods) and run the machine sufficiently long to let the goods become evenly impregnated; then run the liquor off again or extract it by suction (hydro-extracting), and if necessary force steam and air simultaneously through the goods by means of an injector. The goods are developed in 20—30 minutes; then rinse, first warm and afterwards cold.

The regulation of the access of air and steam depends of course entirely upon the construction of the machine; care should be taken that the goods are penetrated as evenly as possible, and the machines should be isolated, so that the heat admitted be made as much use of as possible whereby the action of the oxygen of the air is increased.

The tables on pages 17 and 18 show which of the Katigen Black brands are especially affected in shade when subjected to this method of after-treatment; but we would also mention that the other brands, e. g. Katigen Black SW, are rendered fuller and bloomier when subsequently steamed.

2. Katigen Indigo B extra, R extra and Katigen Chrome Blue 2R.

As already mentioned in the introductory part on machine dyeing much depends upon being acquainted with the solubility of each respective dyestuff: accordingly Katigen Indigo B extra dyed either as a self shade or in combination with Katigen Chrome Blue 5 G is only adapted for light shades and no addition of salt should be employed. For medium and dark shades it is preferable to employ Katigen Indigo R extra, either in self shades or in the usual combinations. An addition of salt is also in this case not necessary, but an addition of Turkey red oil has some effect.

3. Katigen Black Brown N, Katigen Brown V extra, Katigen Yellow Brown GG, Katigen Green 2B.

The directions given on page 26 also equally apply for the working of the above colours, with the exception that the addition of salt should correspond to the volume of dye liquor, e. g. for a volume of dye liquor of 7:1 of goods only about one third the quantity of salt as stated on page 26 is necessary.

These colours need not be after-treated in any way whatever.

Directions for dyeing Katigen Chrome Blue 5 G and Katigen Chrome Brown 5 G will also be found in Part II, and for light or combination shades we refer you to Part VII. (Fashion shades.)

B. Dyeing of Cheeses, Cops and Yarn in Machines.

The introductory remarks in the chapter on machine dyeing particularly apply here, viz. that great care should be taken in dissolving the colour, and for the first bath a correspondingly less addition of salt be taken or the quantity of colour be increased.

In dyeing hanks in machines it is always a matter of dyeing goods closely packed, and therefore the method of working is the same as that described above for loose cotton; the same refers to cheeses and cops when dyeing them in a compact form in machines.

In dyeing cheeses and cops in this way not so much time is lost in filling the machine, and one machine can be employed for all goods of this kind. It should on the other hand, however, be taken into consideration, that each separate cop or cheese lose their form more or less owing to their being tightly pressed, and this is a drawback when reeling off; by this method of packing it is also very difficult to obtain even shades, as the dye liquor passes through the goods in the machines where it meets with the least resistance, in other words the dyeing is uneven. With a certain amount of practice such drawbacks can easily be surmounted in dyeing cheeses, but in cop dyeing such machines should be employed in which each separate cop is so to say dyed by itself and for this purpose is stuck up on the cop carrier.

a) Dyeing of yarns or cheeses. The hanks are twisted slightly and are put into the machine in such a way that the hanks lie horizontally and that channels are prevented; it is not absolutely necessary to boil the goods previously or to wet them out well, although by so doing more even shades are obtained.

Cheeses are packed into the machine perpendicularly and as closely as possible and on each row a layer of loose cotton should be placed, thus combining the whole together and these layers of loose cotton can always be used for further lots of the same shade.

Boil up in the usual way with soda, add the colour solution, through a sieve, boil up gently again and finally add the salt, and afterwards boil up again for 8—10 mins. The scum should be clear and not contain any colour particles.

Shut off steam, enter the goods with the usual precaution and set the pump going. Dye for about $\frac{3}{4}$ to 1 hour at a gentle boil, then rinse in the same way as with loose cotton.

Cheeses as a rule need only be washed in the machine in the ordinary way, but as hanks have to be taken out of the machine separately one by one and straightened out again there is not much extra trouble in rinsing them a second time in an ordinary vat at 105° Faht., if necessary with the addition of sulphide of soda, which latter of course has to be entirely removed by a subsequent washing. The further process of working is the same as already described in Chapter III for yarn dyeing.

Katigen Black SW, 2B, Katigen Blue Black B, 4B, R.

	1st Bath	Standing Bath
Colour	18—25 ⁰ / ₀	11—15 ⁰ / ₀
Sulphide of soda crystals (half the amount concentrated)	18—25 ⁰ / ₀	8—12 ⁰ / ₀
Soda ash	6—8 ⁰ / ₀	1½—2 ⁰ / ₀
Glauber's salt crystals (Common salt half the amount)	15—25 ⁰ / ₀	2—3½ ⁰ / ₀

For standing baths please calculate the same as for yarn dyeing, see chapter III, with 1 or 2 intermediate baths.

As the Katigen Blue Black 4B is not so easily soluble the quantity of salt to be added should be reduced, say for the first bath about 6—10⁰/₀ and for standing baths ¾—1½⁰/₀; this also applies in a less degree to Katigen Black 2B.

An addition of Turkey Red Oil is in certain circumstances advantageous for producing even penetration, especially on cheeses.

For mercerised yarns the remarks on page 47 hold good.

After-treating.

The after-treatment by steaming is the only method with which quite satisfactory results can be obtained in this kind of machine dyeing, the reasons for which have been given on page 63.

The ageing by air (steaming) is done in the same way as when working with loose cotton. (See page 22.)

In cases where it is possible to after-treat the goods with metallic salts in the machine, the yarn should be first thoroughly washed and then treated with hot water containing 3—5⁰/₀ acetic acid and ½⁰/₀ bichrome for about 8—10 mins.; then add the clear metallic salts solution, which has previously been prepared with the addition of some acetic acid; the temperature of the after-treating bath should be about 158—175° Faht. and the duration of the after-treatment 20—25 mins. The percentages of ingredients are the same as stated for hank dyeing in chapter III.

It will be readily understood that the washing water as well as that for after-treating should be as soft as possible, for when rinsing with calcareous water a precipitate is formed on the goods, and also when employing hard water the metallic salts are precipitated, but this can be partly prevented by adding the acetic acid first. An addition of copper sulphate or alum invariably produces a precipitate of sulphate of lime, which is difficult to remove from the goods. Bichrome is also liable in strongly calcareous water to produce a precipitate which is also soluble with difficulty, although an addition of acetic acid prevents such formation. All these precipitates are of course retained by the goods for which reason difficulty arises in after-treating in the machine itself, despite a thorough rinsing of the goods. It is therefore advisable, when possible, at least in hank dyeing to after-treat them in the ordinary dye vat, as the precipitates are here not so inconvenient, and on washing they come off again.

Katigen Indigo B extra and R extra, Katigen Chrome Blue 2R. Please refer to directions given on pages 64 and 65 for the dyeing of loose cotton, roving and slivers in machines.

Katigen Brown V extra, Katigen Yellow Brown GG, Katigen Black Brown.

All these products, which are very easily soluble, can be dyed in machines. The directions given for the dyeing of these products on loose cotton can be considered as applicable in the present instance.

b) Dyeing of cops in machines. The method of dyeing cops, which are packed in bundles the same as yarn, is described in the preceding chapter; when the cops are stuck up separately on the discs they are penetrated more thoroughly by the dye liquor, and the after-treating ensures more level dyed shades.

It should be remembered that for a given shade to be produced on cops 10—15% more colour is required than to obtain the same shade on yarn, the directions therefore given for dyeing loose cotton also apply here (see page 22). With respect to the method of working care has to be taken in pumping or in drawing the liquor by suction transversally through the goods that the liquor be sufficient to completely cover the whole of the cops, or should the construction of the machine not admit of this then the counter current of dye liquor should be rotated as quickly as ever possible.

It is advisable to wet out the cops in a boiling bath containing Turkey Red Oil and soda before adding the colour; in many cases, especially when employing colours that are not so easily soluble, it is likewise advantageous to dye for the first half of the dye process without any addition of salt. For such colours it is useful to add to the first bath $\frac{1}{2}$ — $\frac{3}{4}$ % glucose (of the weight of the colour), as the dye is thereby more easily dissolved and consequently colour particles are prevented from settling on the surface of the cops.

It is of course evident that for this kind of cop dyeing steam is the only medium for circulating the liquor through the machine, for, should compressed air be used, the dye liquor would be reduced in temperature, and the sulphide of soda, which is necessary to keep the colour continually in a complete solution, would also become comparatively more quickly ineffective.

Any scum formed on the surface of the dye liquor during the dyeing process must be skimmed off.

As great importance is attached to the uniformity of shade on the outside and inside of the cops it is advantageous in washing to add to the first bath 2—3% sulphide of soda and to warm the bath up to 105° Faht.

The after-treatment with steam and air is the simplest method in cop dyeing where spindles are used. Machines now-a-days have been so improved that the methods of dyeing are greatly simplified and the cost of working considerably reduced, as the cops, when dyed and rinsed, can now be freed from all superfluous liquor by steaming or injecting compressed air, so that the troublesome removing of the cops themselves and the hydroextracting

are entirely obviated. It is therefore advisable to combine the preliminary extracting and developing in one operation by inserting an injector.

As already mentioned caustic alkalies (soda lye) considerably favours the development by steaming; therefore add to the rinsing bath about $1\frac{1}{2}$ — $2\frac{1}{2}$ % strong caustic soda liquor 60—70° Tw., and then inject steam and air simultaneously for about 20—30 mins. When steamed rinse again.

What has been said on page 67 for after-treating yarn and cheeses with metallic salts equally applies here.

When employing hard calcarous water in rinsing a white incrustation on the cops often appears after steaming, which originates from the carbonate of lime caused by the effect of the caustic soda on the hard water; a short rinsing with the addition of 2—5% acetic acid is quite sufficient to restore the original appearance of the cops. None of the fittings of the machine in which the goods are after-treated should be soldered with lead, as the action of bichrome and acetic acid on the lead would cause the formation of chromate of lead.

When goods dyed in machines are after-treated with metallic salts it is advisable to wash them in a slightly alkaline bath. When topping or brightening in the machine itself great care should be taken that the basic colours, which fall on very quickly, are evenly fixed (employ a larger quantity of acetic acid).

Remarks: The above particulars refer especially to Blacks dyed with the various Katigen Black brands; with respect to the dyeing of

Katigen Black Brown N, Katigen Brown V extra,
Katigen Yellow Brown GG, Katigen Chrome Brown 5G,
Katigen Green 2B, Katigen Chrome Blue 5G,

we refer you to Part II, "Dyeing of loose Cotton".

In dyeing Katigen Green 2B the percentage of salt should not be more than 5—8% and for Katigen Chrome Blue 5G no addition of salt whatever is necessary whether for hanks, cheeses or cops.

It should not be omitted to after-treat Katigen Chrome Blue 5G and Katigen Chrome Brown 5G with bichrome and copper sulphate if the shade is to be developed properly.

For the dyeing of Katigen Indigo B extra, R extra, Katigen Chrome Blue 2R on cops we refer you to pages 64 and 65.

C. The Dyeing of beamed Warps in Machines.

As supplementary to our remarks on the different methods of dyeing we now give you in the following a description of the dyeing of warps on the beam; this warp beam is nothing more than a very large cop and has to be considered such in dyeing.

In preparing the dye baths the same precautions should be taken as already mentioned for cop dyeing; much depends of course upon the way these beams have been warped, as for instance if Egyptian yarns are warped

tightly, the duration of the dye process is not only lengthened but the warps are not penetrated so well, in other words uneven shades are liable; and the same also refers to dyeing beams that have been loosely warped.

As regards the preparing of the dye bath and the percentage of colour and ingredients necessary the same applies here as for machine dyeing. The liquor should also be pumped by steam and not by compressed air. We here-with append a detailed description for working with Katigen Black SW, which will serve as an example of the method of dyeing.

Katigen Black SW dyed on Warp Beams.

	1st Bath	Standing Bath
Katigen Black SW	25 ⁰ / ₁₀	14 ⁰ / ₁₀
Sulphide of soda crystals (half the amount concentrated)	20 ⁰ / ₁₀	12 ⁰ / ₁₀
Glauber's salt crystals (Common salt half the amount)	25 ⁰ / ₁₀	14 ⁰ / ₁₀
Soda ash	4 ⁰ / ₁₀	2 ⁰ / ₁₀

Prepare the bath in the ordinary way with soda ash, add half the quantity of the colour solution, which has been previously dissolved with the sulphide of soda, then boil up and enter the warp beam; start the pump, and by suction bring the liquor through the warp into the reserve cistern, boil up again, add the remainder of the colour solution and pump back. The duration of the dye process lasts 1—2 hours, much depending upon how the warps are reeled, the liquor should circulate at the boil all the time. Finally rinse in the ordinary way. (See chapter on dyeing machine.)

Katigen Black TG and a combination of Katigen Black SW and Katigen Black Brown N are also suitable for the production of a fine black shade on warps.

For blue blacks we would recommend Katigen Blue Black B dyed direct without any after-treatment.

D. Dyeing of Cheeses, Cops, Loose Cotton and Hanks in the Lather (System Wanke).

Excellent results as regards level shades and good penetration of the goods can be obtained by this peculiar method of dyeing, which has lately been extensively adopted in the dyeing of Katigen Colours. The machine is simplicity itself and can be employed for the dyeing of plain standard shades on goods that are penetrated with difficulty, such as cops etc. As can be seen from the illustration the machine consists of an upright wooden vat F, and D is the closed steam pipe with a coil on the bottom of the vat; on the far side of the vat, just before the outlet valve there is a pipe attached to the main steam pipe, which reaches to the bottom of the vat for supplying the dye liquor with direct steam.

The wooden cage M, which is let into and taken out of the upright vat by means of a pulley, is about 3 or 4 inches from the sides of the dye vat and the bottom of the cage is just immersed a few inches under the surface of the dye liquor, which is $1\frac{1}{2}$ — $1\frac{3}{4}$ feet deep; by covering up the vat with a cloth the heat is retained. When steam is turned on the greater part of the liquor, especially if it contains Turkey red oil, is converted into a lather and penetrates the goods very easily. For about 225 lbs. of cheeses the duration of the dye process is about $1\frac{1}{2}$ hours; when the goods are dyed the liquor is run off into reservoirs and the material is rinsed well.

As mentioned above this system of dyeing is only suited for plain standard shades, as one cannot dye to shade nor can one after-treat; a cheap deep black on cheeses can be obtained with the following recipe, the percentages of which are given for standing baths:

- 6 $\frac{0}{10}$ Katigen Black SW,
- 3 $\frac{0}{10}$ Katigen Black Brown N,
- 12 $\frac{0}{10}$ sulphide of soda cryst.,
- 8 $\frac{0}{10}$ soda ash,
- 30 $\frac{0}{10}$ Glauber's salt cryst.
- 2 $\frac{0}{10}$ Turkey red oil.

The bath should be prepared in the ordinary way and the goods are not after-treated at all.

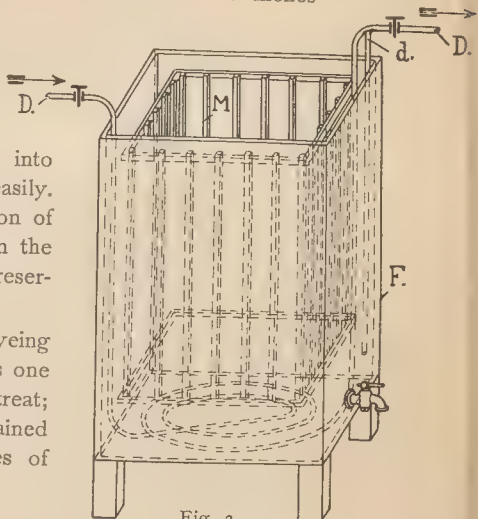


Fig. 2.



Pattern Sheets of Cotton Yarn.

(The percentages in brackets refer to standing baths.)

41. 30% Katigen Blue Black B [17]
(dyed direct)

42. 30% Katigen Black TG [17]
(dyed direct)

43. 30% Katigen Black SW [17]
(dyed direct)

44. 30% Katigen Black SW [17]
3% bichrome
5% acetic acid

45. 30% Katigen Black SW [17]
3% bichrome
3% alum
5% acetic acid

46. 30% Katigen Black 2B [17]
3% bichrome
3% copper sulphate
5% acetic acid

47. 30% Katigen Blue Black R [17]
3% bichrome
3% copper sulphate
5% acetic acid

48. 30% Katigen Blue Black 4B [17]
3% bichrome
3% copper sulphate
5% acetic acid

Cotton Yarn (Sewing Thread).

41.



42.



43.



44.



45.



46.



47.



48.



(The percentages in brackets refer to standing baths.)

49. 20% Katigen Blue Black B [12]
(dyed direct)

50. 20% Katigen Black SW [11]
(dyed direct)

51. 20% Katigen Black SW [12]
3% bichrome
5% acetic acid

52. 20% Katigen Black SW [12]
3% bichrome
4% alum
5% acetic acid

53. 20% Katigen Blue Black 4 B [12]
3% bichrome
3% copper sulphate
5% acetic acid

54. 20% Katigen Blue Black R
3% bichrome
3% copper sulphate
5% acetic acid

55. 20% Katigen Black 2 B [12]
3% bichrome
3% copper sulphate
5% acetic acid

56. 20% Katigen Black 2 B [12]
(steamed)

57. 8% Katigen Black SW [6]

3% aniline salt
4% sulphuric acid
4% bichrome
2% copper sulphate

Cotton Yarn (Mule).

49.



50.



51.



52.



53.



54.



55.



56.



57.



(The percentages in brackets refer to standing baths.)

58. 15% Katigen Blue Black 4B [10]

3% bichrome
3% copper sulphate
5% acetic acid

59. 15% Katigen Blue Black B [10]
(dyed direct)

60. 15% Katigen Black 2B [10]

3% bichrome
3% copper sulphate
5% acetic acid

61. 15% Katigen Black SW [10]

3% bichrome
4% alum
5% acetic acid

62. 13% Katigen Black SW [9]
2% Katigen Green 2B [1.6]
(dyed direct)

63. 15% Katigen Black TG [10]
(dyed direct)

64. 15% Katigen Blue Black R [10]

3% bichrome
3% copper sulphate
5% acetic acid

Mercerised Cotton Yarn.

58.



59.



60.



61.



62.



63.



64.



(The percentages in brackets refer to standing baths.)

65. 1.5% Katigen Indigo B extra [1.5]

1% bichrome
2% copper sulphate
3% acetic acid

66. 2.5% Katigen Indigo B extra [2.2]

2% Katigen Chrome Blue 5G [1.8]

2% bichrome
2% copper sulphate
3% acetic acid

67. 5% Katigen Indigo B extra [3.5]

3% bichrome
3% copper sulphate
5% acetic acid

68. 7.5% Katigen Indigo B extra [4.5]

3% bichrome
3% copper sulphate
5% acetic acid

69. 7.5% Katigen Indigo B extra [4.5]

5% Katigen Chrome Blue 2R [3]

3% bichrome
3% copper sulphate
5% acetic acid

70. 7.5% Katigen Indigo B extra [4.5]

3% Katigen Blue Black 4B [2.2]

3% bichrome
3% copper sulphate
5% acetic acid

71. 9% Katigen Indigo B extra [5.5]

2.5% Katigen Blue Black R [2]

3% bichrome
3% copper sulphate
5% acetic acid

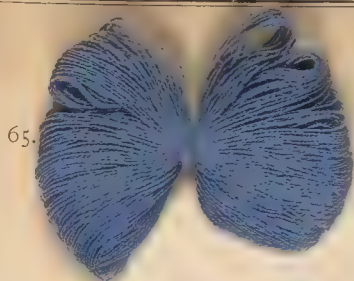
72. 9% Katigen Indigo B extra [5.5]

5% Katigen Chrome Blue 2R [3]

3% bichrome
3% copper sulphate
5% acetic acid

0.05% Rhoduline Red G
0.03% Methyl Violet B

Cotton Yarn.



66.



68.



70.



72.

(The percentages in brackets refer to standing baths.)

73. 7.5% Katigen Indigo R extra [4.5]
2% Katigen Chrome Blue 5G [1.5]

3% bichrome
4% copper sulphate
5% acetic acid

74. 9% Katigen Indigo R extra [5.5]
1.5% Katigen Indigo B extra [1.0]

3% bichrome
4% copper sulphate
5% acetic acid

75. 10% Katigen Indigo R extra [6]

3% bichrome
4% copper sulphate
5% acetic acid

76. 12.5% Katigen Indigo R extra [7.5]

3% bichrome
4% copper sulphate
5% acetic acid

0.1% Indon Blue RR

77. 0.7% Katigen Indigo B extra [0.7]
5.7% Katigen Blue Black 4B [4]

2% bichrome
4% copper sulphate
5% acetic acid

0.05% Methyl Violet B

78. 2.9% Katigen Indigo B extra [2.8]
2.7% Katigen Blue Black R [2.6]

2% bichrome
4% copper sulphate
5% acetic acid

79. 3% Katigen Indigo B extra [2.5]
6% Katigen Blue Black R [4]

3% bichrome
4% copper sulphate
5% acetic acid

80. 3% Katigen Indigo B extra [2.5]
8% Katigen Blue Black R [5]

3% bichrome
4% copper sulphate
5% acetic acid

0.1% Indon Blue RR

Cotton Yarn.

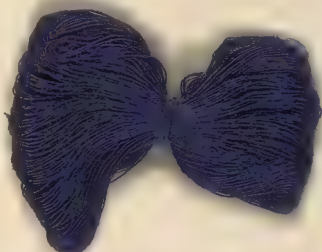
73.



74.



75.



76.



77.



78.



79.



80.



(The percentages in brackets refer to standing baths.)

81. 2.5 % Katigen Chrome Blue 5 G [2.5]

1.5 % bichrome
1.5 % copper sulphate
3 % acetic acid

82. 2.5 % Katigen Indigo B extra [2.5]
2 % Katigen Chrome Blue 5 G [2]

2 % bichrome
2 % copper sulphate
5 % acetic acid

83. 5 % Katigen Indigo B extra [4]

3 % bichrome
3 % copper sulphate
5 % acetic acid

84. 8 % Katigen Indigo B extra [4.8]
4 % Katigen Chrome Blue 2 R [2.8]

3 % bichrome
4 % copper sulphate
5 % acetic acid

85. 10 % Katigen Black Brown N [7]
2.5 % Katigen Brown V extra [2]
(dyed direct)

86. 7.5 % Katigen Indigo R extra [4.5]

3 % bichrome
4 % copper sulphate
5 % acetic acid

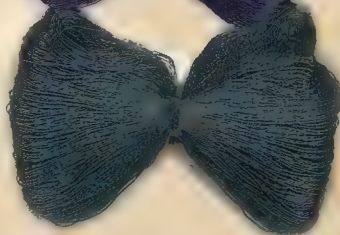
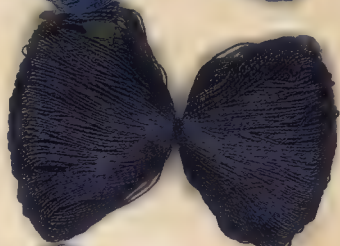
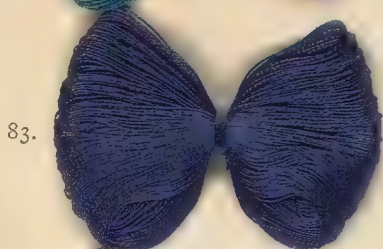
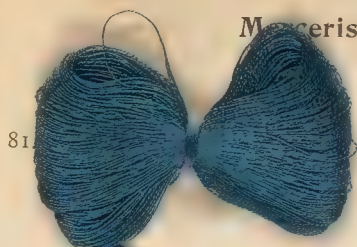
87. 10 % Katigen Olive GN [7]
(dyed direct)

88. 10 % Katigen Green 2 B [6]
(dyed direct)

89. 2 % Katigen Black Brown N [2]
0.75 % Katigen Yellow Brown GG
[0.75]
(dyed direct)

90. 15 % Katigen Black Brown N [9]
10 % Katigen Yellow Braun GG [7]
(dyed direct)

Merised Cotton Yarn.



Fashionable Shades on Cotton Yarn.

91.



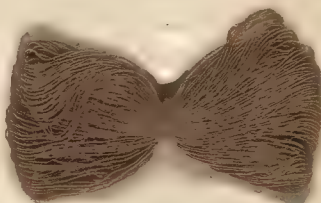
92.



93.



94.



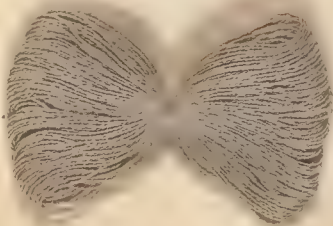
95.



96.



97.



98.



(The percentages in brackets refer to standing baths.)
 The patterns on the next page have been subjected to an after-treatment
 for a short time with bichrome and copper sulphate.

99. 5 % Katigen Black SW [4·8]
 0·25 % Katigen Brown V extra
 [0·25]

100. 2 % Katigen Yellow Brown GG [2]
 1 % Katigen Brown V extra [1]

101. 5 % Katigen Brown V extra [4]

102. 12 % Katigen Yellow Brown GG [8]
 3 % Katigen Brown V extra [2·7]

103. 7·5 % Katigen Olive GN [7]
 5 % Katigen Yellow Brown GG
 [4·8]
 2·5 % Katigen Brown V extra [2·3]

104. 20 % Katigen Yellow Brown GG [12]
 7 % Katigen Brown V extra [5]

105. 14·5 % Katigen Black Brown N [9]
 2·6 % Katigen Brown V extra [2·4]

106. 9 % Katigen Brown V extra [5·5]
 2 % bichrome
 2 % copper sulphate
 3 % acetic acid

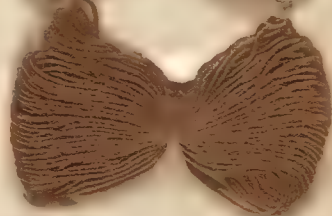
107. 1 % Katigen Yellow Brown GG [1]
 1·5 % Katigen Brown V extra [1·5]

108. 15 % Katigen Brown V extra [9]

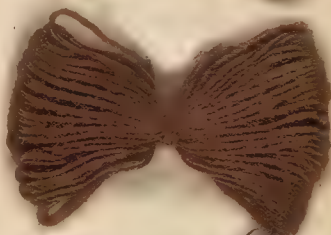
Fashionable Shades on Cotton Yarn.



100.



102.



104.



106.



108.

(The percentages in brackets refer to standing baths.)
 The patterns on the next page have been subjected to an after-treatment
 for a short time with bichrome and copper sulphate.

- | | |
|---|---|
| 109. 3% Katigen Olive GN [3]
4% Katigen Yellow Brown GG [4] | 110. 3% Katigen Black TG [3]
5% Katigen Green 2B [4] |
| 111. 9% Katigen Green 2B [5.5]
3% Katigen Yellow Brown GG [2.8] | 112. 15% Katigen Black Brown N [9]
5% Katigen Yellow Brown GG [3] |
| 113. 8% Katigen Yellow Brown GG [6]
2.5% Katigen Olive GN [2.3] | 114. 1.8% Katigen Black SW [1.8]
0.275% Katigen Chrome Blue 2R [0.275] |
| 115. 3.75% Katigen Black SW [3.7]
1% Katigen Chrome Blue 2R [1] | 116. 5.5% Katigen Olive GN [5.4]
0.08% Katigen Green 2B [0.08]
1.1% Chloramine Yellow M [1] |
| 117. 13% Katigen Yellow Brown GG [8]
4% Katigen Brown Vextra [2.5] | 118. 1.75% Katigen Yellow Brown GG [1.5]
0.5% Katigen Brown Vextra [0.5] |

Fashionable shades on unmercerised and mercerised cotton yarn.



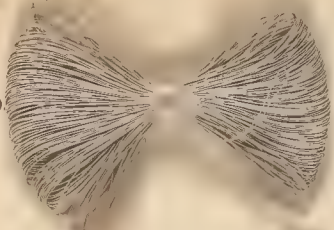
(The percentages in brackets refer to standing baths.)
 The patterns on the next page have (with the exception of Nos. 126 and 127) been subjected to an after-treatment for a short time with bichrome and copper sulphate.

- | | |
|--|--|
| 119. 0.17 % Katigen Black SW [0.17]
0.57 % Katigen Black Brown N [0.57] | 120. 4 % Katigen Yellow Brown GG [4]
0.57 % Katigen Black Brown N [0.57]
0.15 % Katigen Olive GN [0.15] |
| 121. 0.9 % Katigen Black SW [0.9]
1.2 % Katigen Black Brown N [1.2] | 122. 9 % Katigen Yellow Brown GG [6]
1.3 % Katigen Black Brown N [1.1] |
| 123. 1.2 % Katigen Black SW [1.2]
4.0 % Katigen Black Brown N [4] | 124. 9 % Katigen Yellow Brown GG [6]
8 % Katigen Black Brown N [5] |
| 125. 0.9 % Katigen Yellow Brown GG [0.9]
0.01 % Katigen Black Brown N [0.01]
0.02 % Benzo Rhoduline Red B [0.02] | 126. 7 % Katigen Chrome Brown 5 G [5.8]
0.25 % Katigen Green 2 B [0.25]
2 % Chloramine Yellow HW [1.5]
3 % bichrome
3 % copper sulphate
5 % acetic acid |
| 127. 25 % Katigen Black SW [15]
2 % bichrome
2 % copper sulphate
5 % acetic acid | |

For conversion of decimal percentage into English weights and measures please refer to the tables printed on the inside of the back cover.

Polished Cotton Yarn.

119.



120.



121.



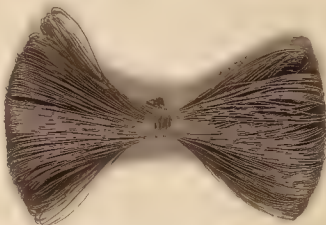
122.



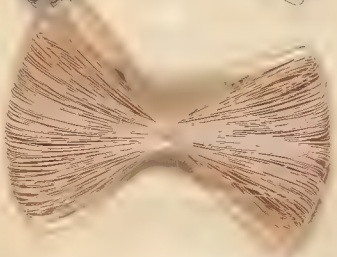
123.



124.



125.



126.



127.



128. 23% Katigen Black SW [14]

3% bichrome
1.5% copper sulphate
5% acetic acid

129. 23% Katigen Black TG [14]

3% bichrome
1.5% copper sulphate
5% acetic acid

130. 20% Katigen Black SW [12]
(dyed direct)

131. 10% Katigen Olive GN [6]
(dyed direct)

132. 10% Katigen Indigo R extra [6]

3% bichrome
4% copper sulphate
5% acetic acid

133. 10% Katigen Brown V extra [6]
(dyed direct)

134. 4% Katigen Yellow Brown GG [4]
0.75% Katigen Brown V extra [0.75]
(dyed direct)

135. 12% Katigen Green 2B [7]
(dyed direct)

136. 15% Katigen Brown V extra [9]

2% bichrome
3% copper sulphate
4% acetic acid

137. 4.8% Katigen Indigo R extra [3.8]
8% Katigen Blue Black 4B [5]

3% bichrome
3% copper sulphate
5% acetic acid

steamed for $\frac{1}{4}$ hour.

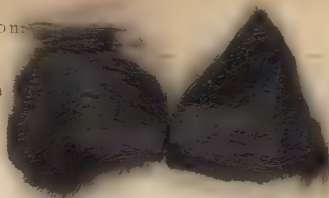
Loose Cotton, Yarns and Cops dyed in machines.

Loose Cottons.

128.



129.



Cotton Yarn.

130.



131.



132.



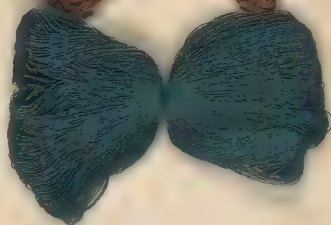
133.



134.



135.

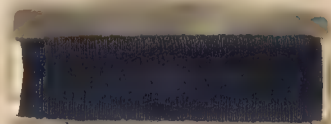


Cops.

136.



137.



138. Katigen Indigo B extra
dyed in combination with
Katigen Chrome Blue 5 G.

139. Indigo

Patterns of Fancy Woven Goods.

Please wash and boil to ascertain the comparative fastness of these patterns.

138.



139.



140. Katigen Black SW

141. Katigen Black SW

142. Blue: Katigen Indigo B extra
Katigen Chrome Blue 5 G
Fashionable Shade:
Katigen Yellow Brown GG
Toluylen Orange G
Light Olive:
Katigen Indigo B extra
Chloramine Yellow HW

143. Red: Benzo Rhoduline Red B
Benzo Fast Orange S
Fashionable Shade:
Katigen Yellow Brown GG
Toluylen Orange G
Light Blue:
Katigen Indigo B extra
Olive: Katigen Olive GN

144. Black:
Katigen Black SW
Yellow:
Chloramine Yellow M.
Benzo Fast Orange S.

145. Black:
Katigen Black SW
Heliotrope:
Benzo Violet R
Brilliant Azurine 5 R

146. Katigen Indigo B extra
Katigen Black SW

Fancy Woven Patterns.

140.



141.



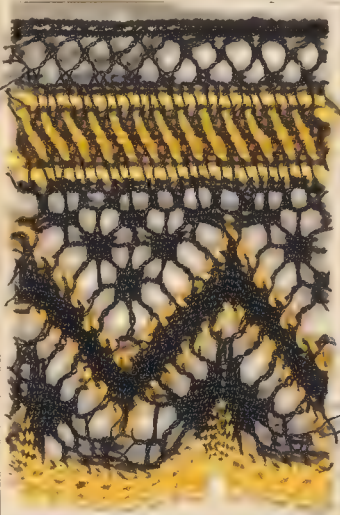
142.



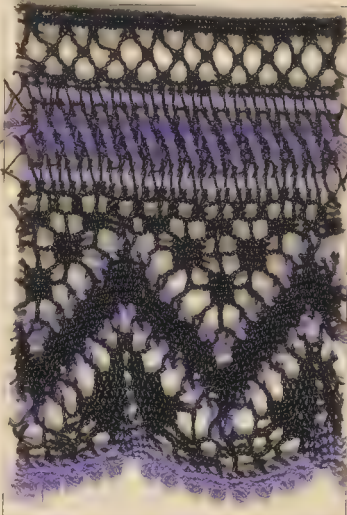
143.



144.



145.



Borders for Shirtings.

146.



147. Dark Blue:
 Katigen Indigo B extra
 Katigen Chrome Blue 2 R
Light Blue:
 Katigen Indigo B extra

148. Dark Blue:
 Katigen Indigo B extra
 Katigen Chrome Blue 2 R
Red: Paranitraniline S

149. Fashionable Shade:
 Katigen Yellow Brown GG
 Toluylen Orange G
Light Blue:
 Katigen Indigo B extra

150. Red: Paranitraniline S
Light Blue:
 Katigen Indigo B extra
Dark Blue:
 Katigen Indigo B extra
 Katigen Chrome Blue 2 R

151. Dyed in the loose cotton:
 Katigen Black SW

152. Katigen Indigo B extra

153. Blue: Katigen Indigo B extra
Black:
 Katigen Blue Black B

154. Katigen Indigo B extra

155. Katigen Black SW

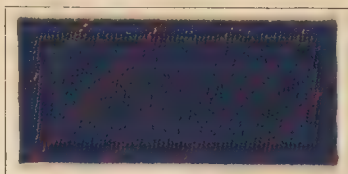
156. Katigen Black SW

Patterns of Fancy Woven Goods and Elastic Web.

147.



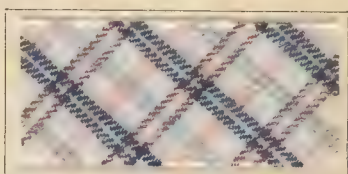
148.



149.



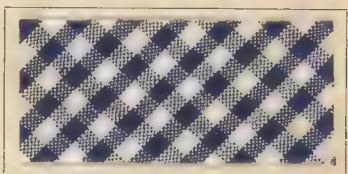
150.



151.



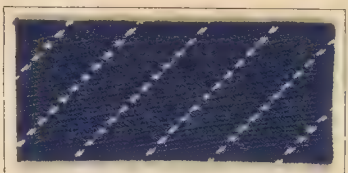
152.



153.



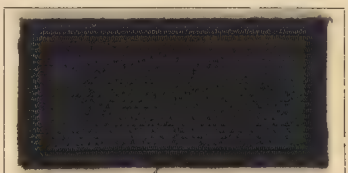
154.



155.



156.



157. and 158. Warp dyed with: Katigen Black SW

159. and 160. Warp dyed with: Katigen Black SW

161. and 162. Warp dyed with: Katigen Black SW

163. Warp dyed with:
Katigen Indigo B extra
Katigen Chrome Blue 2 R

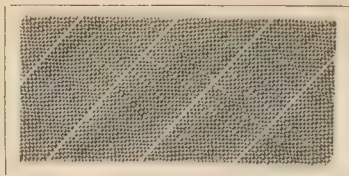
164. Warp dyed with:
Katigen Black SW

165. Warp dyed with:
Katigen Chrome Blue 2 R
Katigen Blue Black R

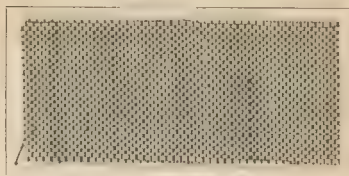
166. Warp dyed with:
Katigen Indigo B extra
Katigen Chrome Blue 2 R

Warps.

157.



158.



159.



160.



161.



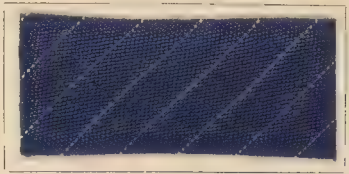
162.



163.



164.

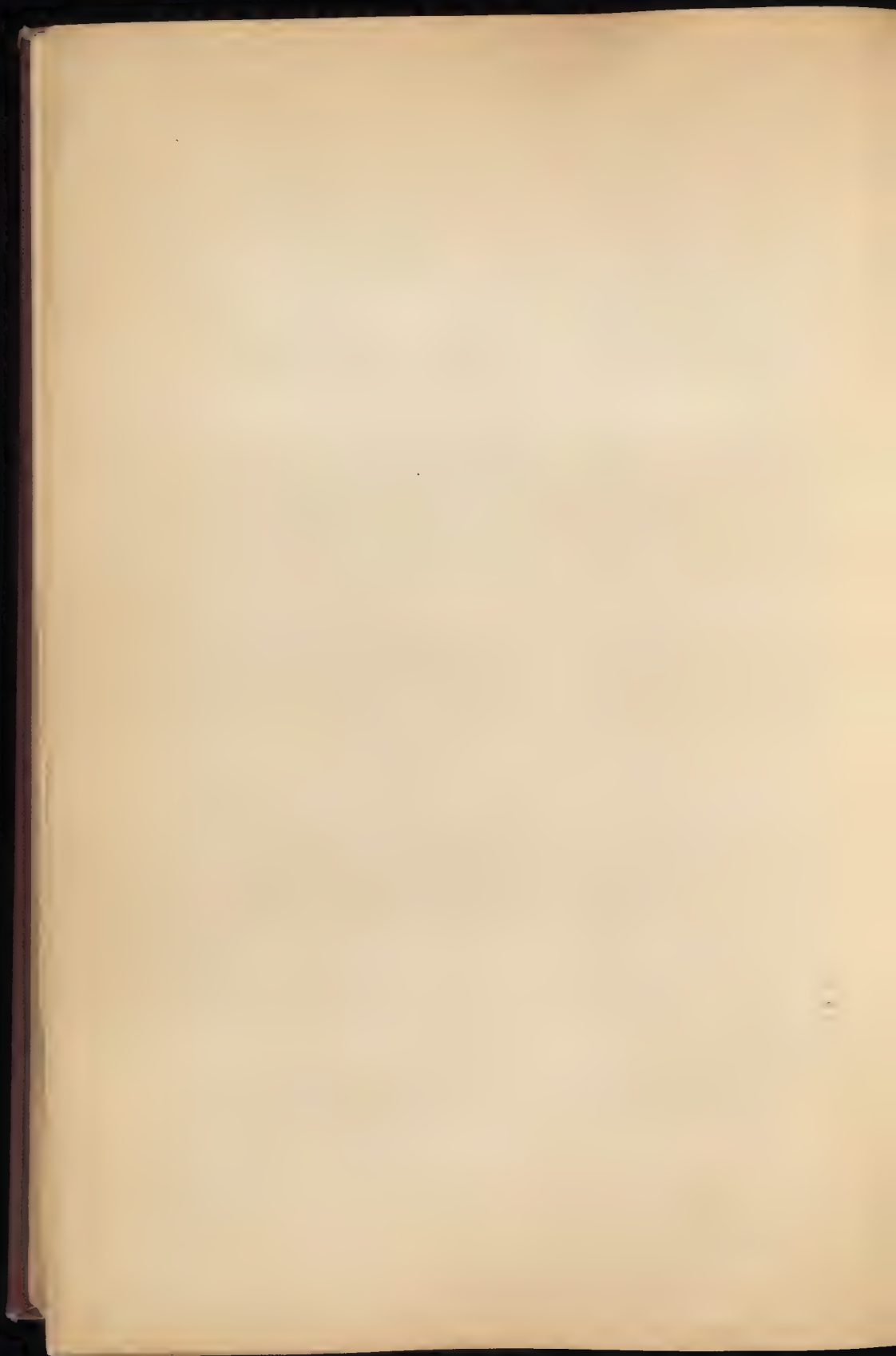


165.



166.





Part VI.

Dyeing of Cotton Pieces.



Part VI.

The Dyeing of Cotton Pieces.

1. Dyeing in the Jig.

a) Katigen Black. The dyeing of the different Katigen Black brands on pieces in the jig is done in the usual way, the only variation being in the selection of metallic salts for after-treating in order to produce the proper shade of each individual brand.

As all the Katigen Black brands dye easily level they can be dyed in any kind of jig without it being necessary to dye immersed in the liquor. For the production of level shades the following points have to be taken into consideration:

1. Run the pieces smoothly and without any creases in them.
2. The dye bath should boil gently all the time.
3. Squeeze out the pieces uniformly before running them into the rinsing bath.
4. The first rinsing bath should be warmed up and should contain some sulphide of soda.
5. Even when the pieces have been thoroughly rinsed it is advantageous to give them 1 or 2 ends in a hot bath containing acetic acid and $\frac{1}{2}$ — $\frac{3}{4}$ % bichrome before adding the rest of the metallic salts.

It must be borne in mind in dyeing in the jig that the volume of dye liquor should be nearly the same for a large as for a small bath, so that the ratio of dye liquor is much less favourable when dyeing only one or two pieces than when working a large number. The volume of dye liquor is generally 3—5:1 of goods, and the percentages given below are calculated on such a base. In long liquors the percentage of colour, etc. for the first bath must be correspondingly increased; when dyeing only a small number of pieces not so much attention should be paid to the number of ends to be given but rather to the time the goods should be dyed, viz. $\frac{3}{4}$ —1 hour.

	1st Bath	2nd Bath	3rd Bath
Colour	18—25 $\frac{0}{10}$	14 $\frac{1}{2}$ —20 $\frac{0}{10}$	12—15 $\frac{0}{10}$
Sulphide of soda crystals	18—25 $\frac{0}{10}$	12—14 $\frac{0}{10}$	8—12 $\frac{0}{10}$
Soda ash	8 $\frac{0}{10}$	4 $\frac{0}{10}$	2 $\frac{0}{10}$
Glauber's salt crystals (Common salt half the amount).	15 $\frac{0}{10}$	7 $\frac{0}{10}$	2—3 $\frac{0}{10}$
Turkey red oil	3 $\frac{0}{10}$	$\frac{1}{2}$ $\frac{0}{10}$	$\frac{1}{2}$ $\frac{0}{10}$

Boil up with the necessary quantity of soda and skim off the scum; then wet out thoroughly by running the pieces twice through this alkaline liquor, after this add half the colour solution, which has previously been prepared by dissolving the colour in boiling water together with the sulphide of soda, boil up for a short time and then enter the goods. It is generally sufficient to obtain the desired shade by giving the pieces 8 ends.*)

As regards good penetration of the goods it is advantageous to give the pieces 4 ends before adding the salt or to add the colour and Glauber's salt in two portions for the same number of ends, which is especially the case when running the jig slowly or when dyeing a large number of pieces.

When the dyeing process is completed the goods are squeezed thoroughly and evenly through a mangle attached to the jig, in which case the pieces can be run on to another jig and washed off or the goods are put on to a padding machine or open washer of in which they can be thoroughly washed and squeezed.

The first wash water containing 2—3% sulphide of soda crystals on the weight of the goods should be at about 100° Faht., give two ends in this bath and then wash thoroughly in cold water.

In cases where the pieces show reddish lists or a bronzy appearance on the whole surface of the goods this can be removed by squeezing out the dye liquor before rinsing and as mentioned above by adding sulphide of soda to the first luke warm wash bath.

From the table on pages 17 and 18 it can be distinctly seen which of the Katigen Black brands are suitable for direct dyed shades or those which must be after-treated.

The bath for after-treating is prepared with 3—5% acetic acid and $\frac{1}{2}$ — $\frac{3}{4}$ % bichrome and the pieces are run twice through this bath to free them from any alkalies or sulphides still contained in them; then add the dissolved metallic salts and run 4 ends through this boiling bath. Finally wash again thoroughly, and then treat in a slightly alkaline solution (Soda, ammonia, etc.) See general remarks on page 11.

There is scarcely any difference between the depth of shade on pieces dyed with Katigen Blacks and that of Aniline Black; the method of working is much simpler, and the fastness of Katigen Colours is superior (the shades

*) To obtain full shades with a comparatively low percentage of colour treat the pieces before dyeing with caustic soda. Run them 5—8 ends through caustic soda of 15° Tw. at 100—120° Faht. and dye in the usual way; when treating the pieces in this way it is of course not necessary to wet out or boil them before commencing dyeing.

being fast to acids and not being liable to become green), the goods are not tendered in the least, as is often the case with Aniline Black, no matter how carefully the goods may have been dyed. Owing to the large range of Katigen Blacks and the various methods of after-treatment applicable the dyer has more scope to produce a greater number of tones.*)

In the chapter on dyeing in the open dye vessel a further simplification of the whole branch of dyeing fast blacks is fully described.

b) The dyeing of Katigen Indigo B extra, R extra, Katigen Chrome Blue 2R in the jig. The production of fast blues with an indigo tone is of far more importance in the dyeing of pieces than for yarns. As the various Katigen Indigo and Katigen Chrome Blue brands dye easily level in the ordinary jig, these colours, owing to their possessing a number of advantages compared with Indigo dyeing, have undoubtedly a good prospect of being extensively employed in future. Quite apart from the efficiency and low cost of dyeing in the jig as compared with the complicated method of working according to the continuous dye or dipping process the range of shades that can be produced by suitable combinations is unlimited, and the brightness of Katigen Colours, as well as their good resistance to repeated washing and boiling and their fastness to light and friction are all considerably better, and the cost of dyeing a given shade, especially dark shades, is already, even though this category of dyestuffs is still in the chrysalis stage, much lower than that of Indigo itself.

The general remarks and methods of working given above for jig dyeing of course equally apply for Katigen Blue brands on the whole, and as regards boiling off, preparing of the dye bath, rinsing and after-treating we refer you to the chapter on "The dyeing of Katigen Blacks in the jig".

1. Light Blues on Piece Goods. For the production of light blues on pieces Katigen Indigo B extra as well as R extra in combination with Katigen Chrome Blue 5G or Katigen Green 2B can be employed, as the self shades of the Katigen Indigo brands are for the most part too red. We herewith append a recipe which will be found very useful:

Volume of dye liquor 3:1 to 5:1 of goods.	1st Bath	Standing Bath.
Katigen Indigo B extra	4 $\frac{1}{2}$ %	2.8 %
Katigen Chrome Blue 5G.	1 %	0.6 %
Soda ash	8 %	1
• Sulphide of soda crystals	10 %	5 %
Glauber's salt crystals.	—	—
Turkey red oil	3 %	2 %

*) General remarks: If the shade of a Katigen Colour on pieces or on yarn has turned out too dark the colour can be stripped a little by boiling with the addition of 5—10% sulphide of soda cryst.; should the shade, however, be a great deal too dark or the goods have to be redyed, then it is best to slightly chlore them with bleaching powder, say at $\frac{3}{4}$ —1% Tw.

For most purposes it is sufficient to after-treat goods dyed as above with:

3⁰/₁₀ sulphate of zinc
3—5⁰/₁₀ acetic acid

which after-treatment is very cheap indeed; it should also be remembered, that before commencing to after-treat the goods, they should be given a couple of ends in a bath containing acetic acid and $\frac{1}{2}$ ⁰/₁₀ bichrome.

Much brighter shades can be obtained by after-treating with:

2⁰/₁₀ bichrome
3⁰/₁₀ copper sulphate
3—5⁰/₁₀ acetic acid.

2. Medium Blue on Pieces. For the production of such shades Katigen Indigo B extra and R extra can be recommended, the R extra brand dyeing more easily level than the B extra.

Volume of dye liquor 3:1 to 5:1 of goods.	1st Bath	Standing Bath
Katigen Indigo B extra or R extra.	8 ⁰ / ₁₀	4.8 ⁰ / ₁₀
Sulphide of soda crystals	20 ⁰ / ₁₀	10 ⁰ / ₁₀
Soda ash	8 ⁰ / ₁₀	1 ⁰ / ₁₀
Glauber's salt crystals	—	—
Turkey red oil	3 ⁰ / ₁₀	$\frac{1}{4}$ ⁰ / ₁₀

After-treat with sulphate of zinc or bichrome and copper sulphate (acetic acid).

For medium blues of a greenish tone it is best to take a combination of Katigen Indigo B extra or R extra with Katigen Chrome Blue 5 G or Katigen Blue Black 4 B; e. g. in the recipe above the 8⁰/₁₀ B extra or R extra can be substituted by

6⁰/₁₀ Katigen Indigo B extra or R extra
2.4⁰/₁₀ Katigen Blue Black 4 B.

In this instance it is better to after-treat with bichrome and copper; for many purposes such as for linen, half-linen and thin fabrics etc., it is not necessary to after-treat the goods when dyed a medium blue, the quick and perfect oxydation by the air being quite sufficient for such shades.

3. Dark Navy Blues on Piece Goods. By employing Katigen Blue Black R, Katigen Chrome Blue 2R etc., the same combinations as are used for yarns can as a rule be employed for pieces. For very dark Indigo Blues the redder „R extra“ brand can be employed to advantage, especially when the exact Indigo bronzy shade is imitated by topping with a little Indon Blue RR.

	1st Bath	Standing Bath
Katigen Indigo R extra	10 ⁰ / ₁₀	6 ⁰ / ₁₀
Katigen Blue Black R	5 ⁰ / ₁₀	3 ⁰ / ₁₀
Sulphide of soda crystals	20 ⁰ / ₁₀	10 ⁰ / ₁₀
Soda	8 ⁰ / ₁₀	1 ⁰ / ₁₀
Salt	—	—
Turkey red oil	3 ⁰ / ₁₀	$\frac{1}{4}$ ⁰ / ₁₀

Dark shades are not generally after-treated, in which case it must be remembered that the brightness of the shade and the fastness to boiling are not quite so good. Unless the Katigen Indigo brands are used as self shades we recommend always to after-treat with

2% bichrome
3% copper sulphate
2—5% acetic acid

for about $\frac{1}{2}$ hour just under the boiling point.

c) Katigen Green 2B, Katigen Chrome Blue 5G, Katigen Black Brown N, Katigen Brown V extra, Katigen Yellow Brown GG, Katigen Chrome Brown 5G. All these colours can be dyed without any difficulty whatever in the jig, and the dye bath should be prepared in exactly the same way as stated for those colours suited for yarn dyeing.

By adhering to the instructions given in the following chapter on the dyeing of "Fashionable and Khaki shades dyed with Katigen Colours", khaki shades can be produced in the same way as above described.

2. Katigen Indigo B extra and R extra dyed in the Indigo Vat.

Although the dyer himself may be convinced of the superiority of the Katigen Colours he will in many instances, especially when his customer demands that the goods contain Indigo, not be able to have recourse at once to the substitute; he must also take into consideration the machinery at disposal, with which plant the Katigen Blues cannot be dyed according to the ordinary recipes.

The Katigen Blue brands cannot only be dyed alone like Indigo in a vat but are also adapted for dyeing in combination with Indigo in an Indigo vat, and the following two vats have been found to give the best results:

1. Sulphide of soda, soda lye and syrup (Glucose) vat.
2. Hydrosulphite vat.

In both cases Indigo can be dyed along with the Katigen Colour, and good results in every respect are obtainable; the reduction is easily effected. The goods can be dyed either cold or at a temperature of 70—85° F. and the oxydation takes place without any difficulty, the dyed shade being faster than that dyed with Indigo alone. The hydrosulphite vat can be employed with the same kind of plant as used for Indigo, the sulphide of soda and syrup vat, however, cannot be employed if any of the fittings are made of copper or brass. As regards the dyeing of Katigen Indigo B extra or R extra and Indigo in separate vats, it has been ascertained that the best results are obtained when working in the Indigo vat first before entering the Katigen Indigo vat (containing if necessary an addition of Katigen Chrome Blue 5G or Katigen Blue Black 4B).

Special directions and recipe for working will be found in a special pamphlet on the subject, which is in course of preparation.

3. The Dyeing of Pieces in the ordinary Open Dye Vessel.

Such Katigen Colours as Katigen Black Brown N, Katigen Brown V extra, Katigen Yellow Brown GG, Katigen Chrome Brown 5G, Katigen Green 2B, Katigen Indigo R extra and Katigen Chrome Blue 5G, etc., which do not fall out of solution by the action of the atmosphere can be dyed in an open dye vessel without any particular directions. The additions of colour and other ingredients for the first bath must be correspondingly increased for long liquors; it is essential when dyeing in this manner that the goods be run quickly and that for Katigen Indigo R extra the addition of salt be reduced to 3—5% Glauber's salt cryst. at the most. The goods should also be washed carefully after dyeing.

Owing to the easily level dyeing properties of several of the Katigen Black brands very level shades can be obtained by this most simple method of dyeing; the products which have proved most suited for this purpose, are Katigen Black 2B, Katigen Blue Black 4B, R, Katigen Blue Black B and Katigen Indigo R extra.

Volume of dye liquor 20—22 : 1 of goods.

	1st Bath	2nd Bath	3rd and standing Bath
Katigen Black 2B or Katigen Blue Black 4B	28—33%	18—20%	13—15%
Sulphide of soda crystals (or half the amount concentrated).	30%	13—15%	10—12%
Soda ash	8%	4%	2%
Glauber's salt crystals (Common salt half the amount).	8—10%	4—5%	1—2%

The duration of the dye process lasts 1—1½ hours; the goods must be thoroughly washed and as quickly as possible (if necessary with a slight addition of sulphide of soda).

After-treat in the same way as for Benzidine Colours, as for instance with Benzo Chrome Black, with:

3% bichrome
3% copper sulphate
3—5% acetic acid

for 25 mins. just under the boil; finally wash again well, and the last wash bath should be slightly alkaline.

From recent experiments in bulk it has been ascertained that this simple method of dyeing can still be simplified by previously wetting out the pieces in a soda lye of 12—15% Tw. containing also some Turkey red oil; the dyestuff in this case falls on sufficiently well even in a cold bath and also dyes level; in contradistinction to mercerised goods, as will be seen later, a higher percentage of colour is required for the first bath and the goods are not penetrated so well. As, however, only the percentages for standing baths can be taken as a base for the calculations, the actual quantity of colour used is not in any way increased.

Add the colour solution, which has been previously prepared by dissolving the dyestuff and sulphide of soda in 6—8 times the quantity of hot water, to the bath containing only soda and a little Turkey red oil; run the pieces, that have been wet out as above described, for about $\frac{1}{2}$ hour cold without any Glauber's salt in the bath; the dissolved Glauber's salt should then be added to the bath in two or three portions. When dyed for 1—1½ hours rinse well and if necessary after-treat. The dyeing recipes are the same as already given at the beginning of this chapter. The directions for dyeing will also be found later under the application of Katigen Colours for padding purposes.

4. The Dyeing of Mercerised Pieces.

a) The dyeing of Katigen Black in the jigger. As already mentioned in the chapter on the dyeing of mercerised yarns, see page 47, Katigen Colours can be dyed in dark shades on mercerised cotton pieces without any particular attention, but greater care has to be taken in wetting out the pieces uniformly before entering the dye bath, as owing to the great affinity of the mercerised fibre to the colour any irregularity in wetting out makes itself perceptible in dyeing; to avoid any bronzy incrustation on the surface of the goods, which is easily perceptible by the reddish tone over hand, or the colour rubbing off, the dye baths should be prepared very carefully.

To produce a given shade on mercerised piece goods it is a general rule that about 25% less colour are required for the first bath than to obtain the same depth of shade on ordinary material. The percentage of colour required for standing baths is not quite so favourable as that for the first bath, but on an average about 15% less colour can be taken than for unmercerised pieces.

Prepare the dye bath with the necessary quantity of soda, and if necessary with a slight addition of Turkey red oil, then boil up for a short time and give two ends in this gently boiling alkaline bath; then add the colour solution containing also the dissolved sulphide of soda, then boil up again for a short time, add the salt and boil up again sharply. Give the pieces as usual 6 to 8 ends at a gentle boil and then match off.

For material difficult to penetrate it is advisable to give the pieces two or three ends before adding the salt, then boil up and give another two or three ends before matching off. When dyeing large quantities of goods the dyestuff and salt are sometimes added to the bath in two equal portions.

Squeeze, wash and after-treat in the same way as when working on ordinary goods.

	1st Bath	Standing Bath
Katigen Black TG	15—20%	10—12½%
Sulphide of soda crystals (or half the amount concentrated).	15—20%	6—8%
Soda ash	2%	1—2%
Glauber's salt crystals (Common salt half the amount).	10—15%	1—2%
Turkey red oil	3%	½%

For standing baths it is also in this case advisable to calculate on a sliding scale with one or two intermediate baths.

For Deep Blacks we recommend Katigen Black TG or SW eventually after-treated with 2% bichrome and 3% copper sulphate, and for a slightly bluish deep black Katigen Black SW after-treated with 2½% bichrome and 3% alum or Katigen Black 2B after-treated with 2% bichrome and 3% copper sulphate can be employed. Katigen Blue Black B also produces a bluish black shade and need not be after-treated with metallic salts. For a very bloomy Blue Black shade Katigen Blue Black 4B after-treated with 2% bichrome and 3% copper sulphate can be employed and Katigen Blue Black R after-treated the same as the 4B brand yields a bloomy violet black shade.

b) Katigen Black dyed in the open dye vessel. For this method of dyeing the brands mentioned in the chapter on piece dyeing in the open vessel are well adapted. The lower percentage of colour required is the same as for jig dyeing, the addition of salt, however, should be slightly less than for ordinary goods but the addition of soda should be increased.

Katigen Black TG dyed direct without any after-treatment and Katigen Black SW in combination with Katigen Green 2B are much employed for the dyeing of mercerised pieces either in the jig or in an open vessel. The Black shades on mercerised goods turn out much redder than when dyed on ordinary cotton, and therefore, especially if the Aniline Oxydation Black shade has to be imitated, a slightly greenish deep black is preferred.

5. Dyeing Cold.

The great affinity that mercerised cotton has for the Katigen Colours has lead to a simplification of the dye method, viz.

a) Dyeing in the jig. Dissolve the colour with an equal quantity of sulphide of soda in 6—8 times the amount of boiling water, and pour this colour solution through a coarse cloth into the cold dye bath containing the soda and Glauber's salt, and enter the well wet out goods into this cold bath. When dyeing a large number of pieces it is advisable, the same as already mentioned for unmercerised goods to add the colour and Glauber's salt in two equal portions. After dyeing for 1 hour rinse as usual in a luke warm bath containing some sulphide of soda, then wash in fresh water, if necessary, after-treat, wash well and dry. The goods, however, when dyed in the above way are not so thoroughly penetrated.

A very fine deep black for instance can be obtained with Katigen Black TG without after-treating when working as follows:

Volume of Dye Liquor 4:1 of goods.

1st. Bath.

Katigen Black TG	16%	} For standing baths calculate in the same way as for unmercerised goods.
sulphide of soda cryst.	16%	
soda ash	8%	
Glauber's salt cryst.	10—15%	

In employing any another brand should the shade turn out too red it can be toned down to a deep black by working according to the following recipe, without the properties of the colour being in any way affected:

Top in a warm bath in the ordinary way with 2—4% Katigen Chrome Brown 5G and after-treat at the boil with

2% bichrome
3% copper sulphate
3—5% acetic acid.

The same effect can be obtained more quickly and simply, although the fastness is slightly affected, by topping with a little Auramine II (say with not more than 0.08% to 0.2% colour).

b) Dyeing in the open vessel. This is carried out in the same way as above described, with the exception that for the first bath more colour is required, e. g. for a ratio of dye liquor of 20:1 of goods about 20% dyestuff are necessary to obtain a deep black.

The shade obtained is remarkably level but as pieces dyed in the open vessel cannot be squeezed out well before entering the washing bath, and as much colour would be lost were the goods to be washed in the ordinary way, it is advisable to rinse first in a special bath containing sulphide of soda, and this liquor can then be used for replenishing the dye bath itself or for dissolving colour for following lots or for fresh baths. In this way the consumption of colour is just as economical as when working in the jig.

c) Katigen Indigo B extra, R extra and Katigen Chrome Blue 2R dyed on mercerised piece goods. Dye in the same way as described for ordinary unmercerised goods, but for the first bath use only three quarters the amount of colour as when dyeing ordinary goods. The R extra is on the whole better adapted for mercerised pieces. Katigen Chrome Blue 2R is chiefly to be regarded as a combination colour, and it dyes very level.

d) Katigen Chrome Blue 5G, Katigen Green 2B, Katigen Black Brown N, Katigen Brown V extra, Katigen Chrome Brown 5G, Katigen Yellow Brown GG. All these colours, which are equally well suited for dyeing in the jig or in an open vessel, are worked in the same way as already described for ordinary goods, but it has to be remembered that for the first bath only about $\frac{2}{3}$ the amount of colour should be taken as when dyeing unmercerised goods, and that for standing baths 15% less colour is required than for the first bath.

Patterns of Piece Goods.

(The percentages in brackets refer to standing baths.)

Dyed in the jig.

167. 18% Katigen Blue Black 4B [11]
2% bichrome
3% copper sulphate
5% acetic acid
168. 20% Katigen Blue Black B [12]
(dyed direct)

169. 18% Katigen Black 2B [11]
2% bichrome
3% copper sulphate
5% acetic acid
170. 18% Katigen Black SW [11]
(dyed direct)

Dyed on the wince.

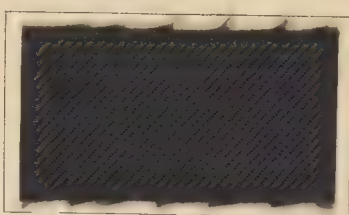
171. 20% Katigen Black 2B [12]
2% bichrome
3% copper sulphate
5% acetic acid
172. 20% Katigen Blue Black B [12]
(dyed direct)
173. 25% Katigen Black SW [15]
2.5% bichrome
3% alum
5% acetic acid
174. 25% Katigen Black TG [15]
(dyed direct)

Unmercerised Cotton Cloth.

167.



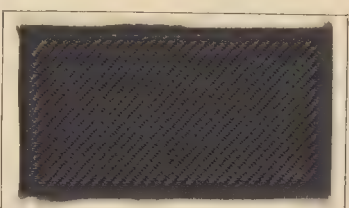
168.



169.



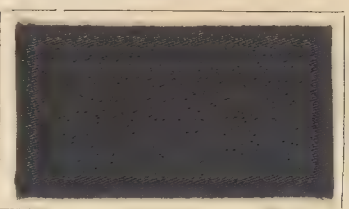
170.



171.



172.



173.



174.



(The percentages in brackets refer to standing baths.)

Dyed in the jig.

175. 12% Katigen Blue Black B [7.2]
(dyed direct)

176. 12% Katigen Blue Black B [7.2]
2% bichrome
3% copper sulphate
5% acetic acid

177. 12% Katigen Blue Black 4B [7.2]
2% bichrome
3% copper sulphate
5% acetic acid

178. 12% Katigen Blue Black R [7.2]
2% bichrome
3% copper sulphate
5% acetic acid

179. 12% Katigen Black 2B [7.2]
(dyed direct)

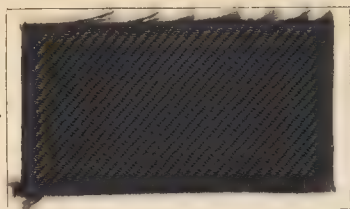
180. 12% Katigen Black 2B [7.2]
2% bichrome
3% copper sulphate
5% acetic acid

181. 10% Katigen Black SW [7]
2% bichrome
3% alum
5% acetic acid

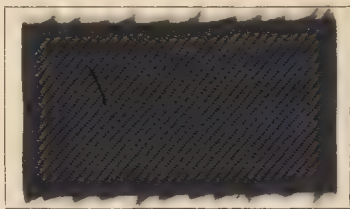
182. 20% Katigen Black TG [12]
2% bichrome
3% copper sulphate
5% acetic acid

Mercerised Cotton Cloth.

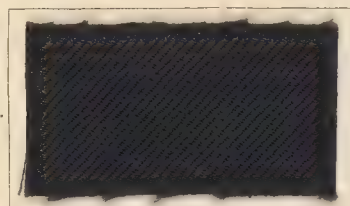
175.



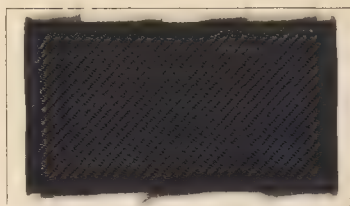
176.



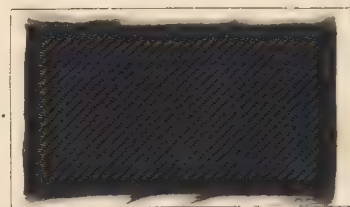
177.



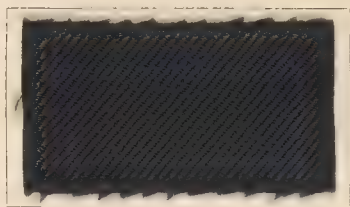
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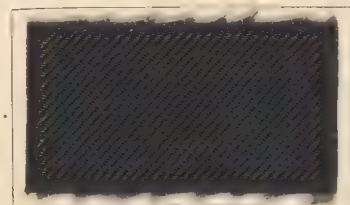
179.



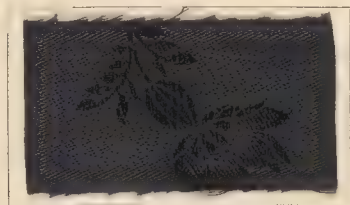
180.



181.



182.



(The percentages in brackets refer to standing baths.)

- | | |
|---|---|
| <p>183. $2\frac{5}{10}\%$ Katigen Indigo B extra [2]
 <hr/> $2\frac{0}{10}\%$ bichrome
 $3\frac{0}{10}\%$ copper sulphate
 $5\frac{0}{10}\%$ acetic acid</p> | <p>184. $2\frac{4}{10}\%$ Katigen Indigo B extra [2]
 $0\frac{75}{10}\%$ Katigen Chrome Blue 5G
 <hr/> $2\frac{0}{10}\%$ bichrome
 $3\frac{0}{10}\%$ copper sulphate
 $5\frac{0}{10}\%$ acetic acid
 <div style="text-align: right;">[0.7]</div></p> |
| <p>185. $7\frac{5}{10}\%$ Katigen Indigo R extra
 <hr/> $2\frac{0}{10}\%$ bichrome
 $3\frac{0}{10}\%$ copper sulphate
 $5\frac{0}{10}\%$ acetic acid
 <div style="text-align: right;">[4.5]</div></p> | <p>186. $12\frac{5}{10}\%$ Katigen Indigo R extra
 <hr/> $3\frac{0}{10}\%$ bichrome
 $4\frac{0}{10}\%$ copper sulphate
 $5\frac{0}{10}\%$ acetic acid
 <div style="text-align: right;">[7.5]</div></p> |
| <p>187. $5\frac{0}{10}\%$ Katigen Indigo B extra [3]
 $5\frac{0}{10}\%$ Katigen Chrome Blue 2R [3]
 <hr/> $3\frac{0}{10}\%$ bichrome
 $4\frac{0}{10}\%$ copper sulphate
 $5\frac{0}{10}\%$ acetic acid</p> | <p>188. Indigo</p> |
| <p>189. $5\frac{0}{10}\%$ Katigen Indigo B extra [3]
 $5\frac{0}{10}\%$ Katigen Chrome Blue 2R [3]
 <hr/> $3\frac{0}{10}\%$ bichrome
 $4\frac{0}{10}\%$ copper sulphate
 $5\frac{0}{10}\%$ acetic acid
 washed</p> | <p>190. Indigo

washed</p> |

Cotton Cloth.

183.



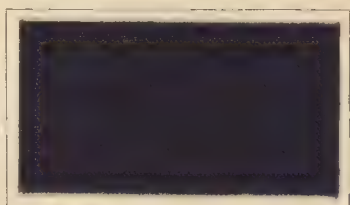
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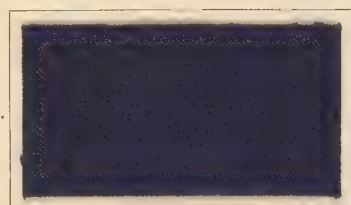
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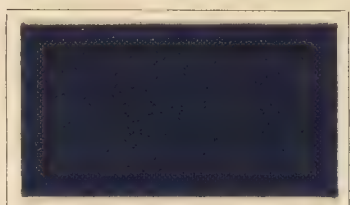
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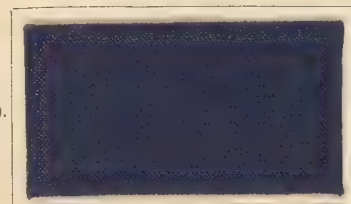
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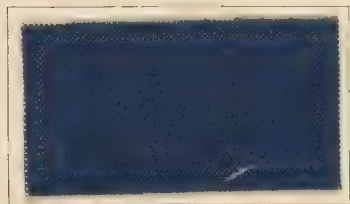
188.



189.



190.



(The percentages in brackets refer to standing baths.)

191. 20% Katigen Blue Black R [12]
(dyed direct)

192. 20% Katigen Blue Black R [12]
2% bichrome
3% copper sulphate
5% acetic acid

193. 20% Katigen Black 2B [12]
(dyed direct)

194. 20% Katigen Black 2B [12]
2% bichrome
3% copper sulphate
5% acetic acid

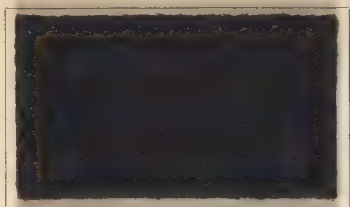
195. 16% Katigen Blue Black B [9.6]
(dyed direct)

196. 16% Katigen Blue Black R [9.6]
(dyed direct)

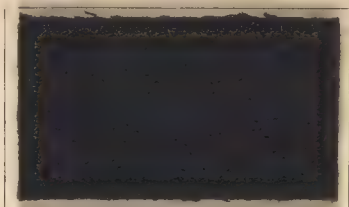
197. 16% Katigen Black SW [9.6]
(dyed direct)

Cotton Suitings.

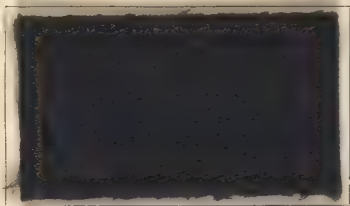
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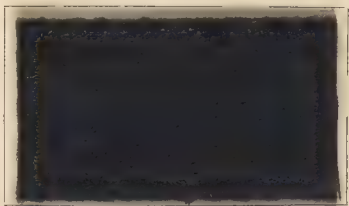
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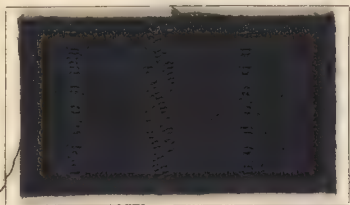
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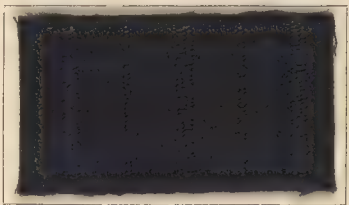
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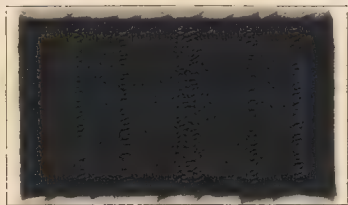
195.



196.



197.

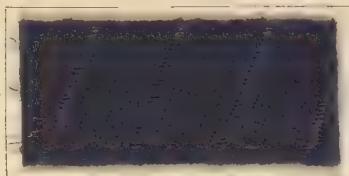


(The percentages in brackets refer to standing baths)

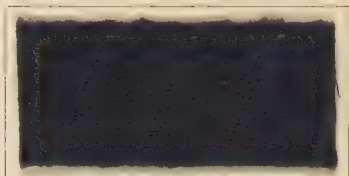
198. 7.5 % Katigen Indigo B extra [4.5]
5 % Katigen Chrome Blue 2R [3]
199. 14 % Katigen Blue Black R [8.4]
2.5 % Katigen Indigo B extra [2]
200. 10 % Katigen Black Brown N [6]
2 % Katigen Black SW [1.8]
201. 2 % Katigen Black SW [2]
202. 0.5 % Katigen Blue Black B [0.5]
203. 10 % Katigen Black Brown N [6]
5 % Katigen Yellow Brown GG
extra [3]
3 % Katigen Black SW [2]
204. 5 % Katigen Indigo B extra [3.5]
2 % Katigen Blue Black R [1.8]
205. 1.5 % Katigen Black Brown N [1.5]
0.3 % Chloramine Yellow M [0.3]
206. 10 % Katigen Black Brown N [6]
1.5 % bichrome
1.5 % copper sulphate
3 % acetic acid
207. 4.5 % Katigen Black Brown N [4]
3.5 % Katigen Yellow Brown GG
[3]

Cotton Suitings.

198.



199.



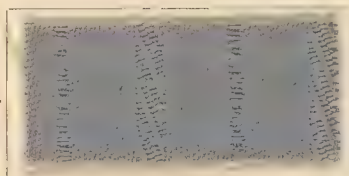
200.



201.



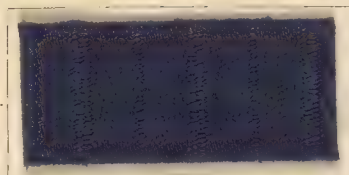
202.



203.



204.



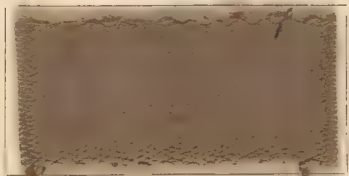
205.



206.



207.



(The percentages in brackets refer to standing baths.)
 The mode shades have been after-treated for a short time in a tepid rinsing bath containing
 1% bichrome, 1% copper sulphate and 3% acetic acid.

- | | | | |
|------|-----------------------------|------|--------------------------------|
| 208. | 1% Katigen Yellow Brown GG | 209. | 5% Katigen Black Brown N [3] |
| | [1] | | 5% Katigen Yellow Brown GG [3] |
| | 0.5% Katigen Olive GN [0.5] | | 1% Katigen Black SW [0.8] |
| | 0.75% Katigen Black Brown N | | |
| | [0.75] | | |

- | | | | |
|------|----------------------------|------|-------------------------------|
| 210. | 0.5% Katigen Yellow Brown | 211. | 1% Katigen Black Brown N |
| | GG extra [0.5] | | [0.8] |
| | 0.3% Katigen Black Brown N | | 0.75% Katigen Yellow Brown GG |
| | [0.3] | | [0.7] |

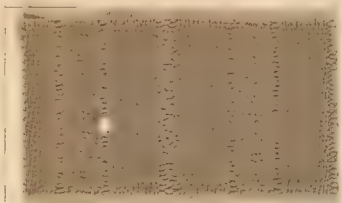
- | | | | |
|------|--------------------------------|------|--------------------------------|
| 212. | 10% Katigen Black Brown N [6] | 213. | 20% Katigen Black Brown N [12] |
| | 5% Katigen Yellow Brown GG [3] | | |

- | | | | |
|------|---------------------------|------|--------------------------|
| 214. | 10% Katigen Green 2B [6] | 215. | 10% Katigen Olive GN [6] |
| | 8% Katigen Olive GN [4.8] | | 4% Katigen Black Brown N |
| | 2% Katigen Black 2B [1.3] | | [2.5] |

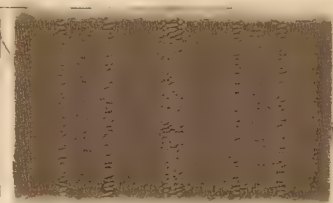
For conversion of decimal percentage into English weights and measures please refer
 to the table printed on the inside of the back cover.

Cotton Suitings.

208.



209.



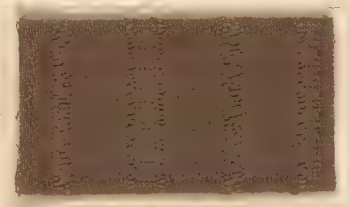
210.



211.



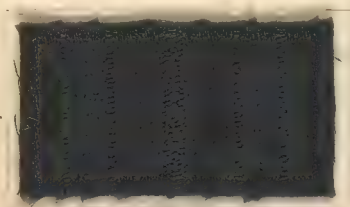
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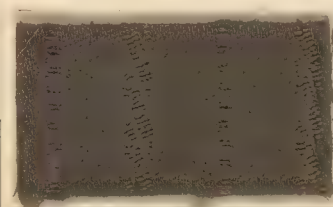
213.



214.



215.

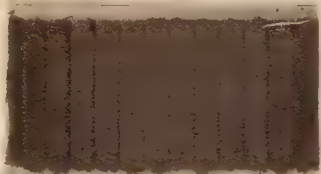


(The percentages in brackets refer to standing baths.)

- | | |
|--|--|
| 216. 4.0% Katigen Black Brown N
[2.5]
Auramine
Bismarck Brown | 217. 5% Katigen Black SW [4] |
| 218. 8% Katigen Black Brown N [5] | 219. 8% Katigen Black Brown N [5]
Bismarck Brown
Auramine
Brilliant Green |
| 220. 20% Katigen Black SW [12]
brushed with Prussian Blue | 221. 10% Katigen Indigo R extra [6]
3% bichrome
4% copper sulphate
5% acetic acid |
| 222. 10% Katigen Black SW [6]
Methylene Blue BB
Safranin FF extra | 223. 10% Katigen Black Brown N [6]
Bismarck Brown
Safranin FF extra |
| 224. 6% Katigen Olive GN [3.8]
2% Katigen Green 2B [1.5]
1.5% Katigen Black Brown N [1]
Auramine
Brilliant Green | |

Velveteen.

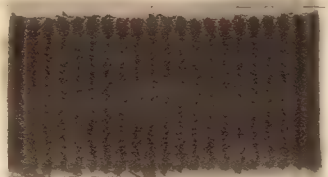
216.



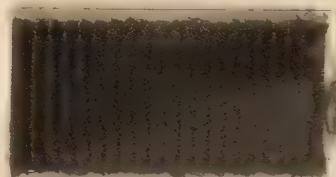
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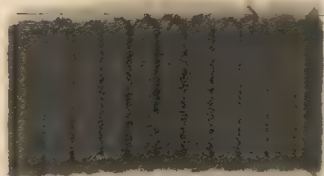
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Part VII.

Fashionable and Khaki Shades dyed
with Katigen Colours.

Part VII.

Fashionable and Khaki Shades dyed with Katigen Colours.

We have in the preceding parts chiefly treated the various Katigen Colours either as self colours or as combination colours in producing dark shades of various tones. The varied application and the large selection of colours for toning purposes make the Katigen Colours especially suited for dyeing fashionable shades, and effects can be produced which could formerly not be obtained equally as fast as with Katigen Colours or had either to be dyed by a very complicated process.

Apart from the large selection of Katigen Colours the varied application is based on the following important facts:

1. All Katigen Colours can be combined with one another, even for light shades, without the evenness of shade or dyeing properties being in any way affected.

2. For light shades, in which case sulphide of soda should be employed in only small quantities or not at all, some fast Benzidine colours can be employed in combination with Katigen Colours without any hesitation.

3. The fastness to light of all the Katigen Colours (also when dyed in combination with some suitable Benzidine colours) is even in the most delicate shades extremely good if they are after-treated with bichrome and copper sulphate.

4. Katigen Colours act as a mordant for Basic Colours and when after-treated with metallic salts also for Mordant Colours, so that to a certain degree the fastness remains intact.

In dyeing combinations in which Katigen Blacks, Katigen Chrome Blue 2 R or Katigen Blue Black are employed it must be remembered that the quantity of sulphide of soda should be equal to the amount of dyestuff, so that from the very beginning a proper solution is obtained. The proportions in the various recipes given for the production of Dark shades still hold good, for Light shades however the percentages of Glauber's salt, sulphide of soda, etc. are correspondingly reduced with the quantity of colour. Ingredients such as soda, Turkey red oil, etc. which are employed in preparing the bath or

that have a special effect on the material must of course not be reduced below a certain level. To give an example, take for instance the following recipe given for the dyeing of Katigen Black on loose cotton:

18—25% Colour
18—25% sulphide of soda cryst.
5% soda ash
2% Turkey red oil
60% Glauber's salt cryst.

which percentages are reduced as follows for a light grey shade:

1.8%—2.5% Colour
1.8%—2.5% sulphide of soda crystals
1—2% soda ash
2% Turkey red oil
6% Glauber's salt cryst.

When dyeing light shades with Katigen Colours the baths are almost completely exhausted, so that for subsequent baths about the same quantity of colour and ingredients are necessary as for the first bath; when dyeing light mode or art shades it must be remembered that some colours only assume their final and proper tone when oxidised by the air, so that quickly dried patterns do not in some cases show the desired tone.

Fashionable shades on loose cotton, in contradistinction to dark shades can be after-treated with metallic salts, without the pliability of the cotton being affected to any extent, one reason for this being that less metallic salt is fixed on the fibre, and another that the after-treatment can be done in a shorter time and at a comparatively lower temperature, whereby the pliability of the cotton remains unaffected. The fastness to light is also improved.

For very light fashionable shades treat for 20 mins at 160—175° Faht. with:

$\frac{1}{4}$ — $\frac{1}{2}$ % bichrome
 $\frac{1}{4}$ — $\frac{1}{2}$ % copper sulphate
3% acetic acid.

For light fashionable shades: treat for 20 mins. at 160—175° Faht. with:

$\frac{1}{2}$ — $\frac{3}{4}$ % bichrome
 $\frac{1}{2}$ — $\frac{3}{4}$ % copper sulphate
3% acetic acid.

For khaki shades on yarns and piece goods we recommend an after-treatment at the boil with

2% bichrome
3% copper sulphate
3—5% acetic acid

even should this treatment have no particular effect upon the shade of the dyed goods.

For the production of light shades with Katigen Colours on yarn or piece goods the precautions that are to be taken for dyeing level shades must also be observed, viz. wet out well or boil the goods before entering the dye bath, enter below the boiling point and commence dyeing without any salt; in many cases the best results will be obtained by dyeing without any salt at all. All these precautions should be carefully observed, especially when dyeing mercerised goods; it is sometimes advantageous to add a little soap to the dye bath, and a slight addition of Turkey red oil will also greatly assist the colour to dye level on all kinds of goods.

The following substantive colours are adapted for dyeing light shades in combination with Katigen Colours:

Toluylene Orange G.
Chloramine Yellow M
Chloramine Orange
Benzo Rhoduline Red B
Geranine G.

Should it be necessary in order to produce the desired shade to employ a comparatively large quantity of Benzidine colour then it is best to bottom with the substantive colour and add the Katigen Colours towards the end.

The basic colours suited for brightening combination shades will be found in the chapter on "yarn dyeing" (page 46); and as mentioned therein the brightening of yarns with basic colours is best done in a hot bath containing soap, although for piece goods this is not so applicable, as it is much better to dye cold with a slight addition of acetic acid.

As regards the fastness to washing Rhoduline Red and Indon Blue 2R have proved very satisfactory for topping Katigen Colours, but when a large amount of basic dyestuff is employed for topping, Methylenblue and Rhodulin-Heliotrope are best as regards fastness to light.



Part VIII.

Dyeing of Linen and Half-Linen.



Part VIII.

The Dyeing of Linen and Half-Linen.

The Dyeing of Linen and Half-Linen. The behaviour of Katigen Colours to the linen fibre is the same as towards the cotton fibre, therefore all the recipes given for cotton dyeing with Katigen Colours equally apply for linen; it must, however, not be overlooked, that the linen fibre is not so thoroughly penetrated by the colour, consequently with the same percentage of colour a darker tone is obtained on linen than on cotton. It may be taken as a general rule, that to produce a given shade on all-linen goods 40—50% and on half-linen 20—30% less colour are required than for the same shade on cotton.

1. Katigen Black.

For deep blacks we recommend Katigen Black SW, dyed either direct or after-treated; for linen goods 10—12% and for half-linen 12—16% dyestuff are sufficient for the first bath. It is advisable to slightly reduce the amount of soda stated in the recipe for cotton dyeing and it is also better not to dye at too high a temperature; otherwise dye in the same way as described for cotton.

For the production of a bluish black Katigen Blue Black B dyed direct without any after-treatment and with the same percentages as for the Katigen Black SW can in most cases be employed.

2. Katigen Indigo B extra, R extra and Katigen Chrome Blue 2R.

Very fine deep indigo tones possessed of excellent fastness can be produced on linen and half-linen with Katigen Indigo B extra or R extra dyed a self shade and even without any after-treatment. For redder and fuller shades dye with the above colours in combination with Katigen Chrome Blue 2R or Katigen Blue Black R, in which case it is necessary, in order to produce the reddish

tone over hand, to after-treat with bichrome and copper sulphate. The method of working is the same as for cotton.

To obtain a coppery tone top with a slight amount of Indon Blue or Methyl Violet.

3. Katigen Green 2B.

This colour is much employed for the dyeing of apron cloth as well as for awnings and window blinds. The method of dyeing is exactly the same as that stated for dyeing cotton.

4. Fashionable and Khaki Shades.

The following colours are adapted for the dyeing of fashionable and khaki shades:

For Greys: Katigen Black SW and 2R, dyed direct or after-treated with 2% bichrome, 3% copper sulphate and acetic acid.

For Buffs: Katigen Black Brown N and Katigen Yellow Brown GG, dyed direct or after-treated as above.

For Khaki shades: Katigen Olive GN, Katigen Green 2B, Katigen Chrome Brown 5G. After-treated as above when required. Tone down with Katigen Black SW.

The khaki shades dyed with Katigen Colours have stood exposure in tropical countries and have been found to be extremely fast to light.

Patterns of Linen and Half-Linen.

(The percentages in brackets refer to standing baths.)

- | | |
|--|---|
| <p>225. 2 $\frac{0}{10}$ Katigen Yellow Brown GG
[1.8]
1 $\frac{0}{10}$ Katigen Brown V extra [0.9]
(dyed direct)</p> | <p>226. 5 $\frac{0}{10}$ Katigen Indigo B extra [3]

2 $\frac{0}{10}$ bichrome
3 $\frac{0}{10}$ copper sulphate
5 $\frac{0}{10}$ acetic acid</p> |
| <p>227. 10 $\frac{0}{10}$ Katigen Indigo R extra [6]

2 $\frac{0}{10}$ bichrome
3 $\frac{0}{10}$ copper sulphate
5 $\frac{0}{10}$ acetic acid</p> | <p>228. 2.5 $\frac{0}{10}$ Katigen Black SW
[2.4]
0.1 $\frac{0}{10}$ Katigen Brown V extra [0.1]
(dyed direct)</p> |
| <p>229. 12 $\frac{0}{10}$ Katigen Black 2 B [7.2]

2 $\frac{0}{10}$ bichrome
3 $\frac{0}{10}$ copper sulphate
5 $\frac{0}{10}$ acetic acid</p> | <p>230. 5 $\frac{0}{10}$ Katigen Indigo B extra [3]

2 $\frac{0}{10}$ bichrome
3 $\frac{0}{10}$ copper sulphate
5 $\frac{0}{10}$ acetic acid</p> |
| <p>231. 2 $\frac{0}{10}$ Katigen Yellow Brown GG
0.05 $\frac{0}{10}$ Katigen Green 2 B
(dyed direct)</p> | <p>232. 0.375 $\frac{0}{10}$ Katigen Black Brown N
[0.375]
0.175 $\frac{0}{10}$ Katigen Brown V extra
[0.175]
0.75 $\frac{0}{10}$ Katigen Yellow Brown GG
[0.75]
(dyed direct)</p> |
| <p>233. 5 $\frac{0}{10}$ Katigen Indigo B extra [3]
5 $\frac{0}{10}$ Katigen Chrome Blue 2 R [3]

2 $\frac{0}{10}$ bichrome
3 $\frac{0}{10}$ copper sulphate
5 $\frac{0}{10}$ acetic acid</p> | <p>234. 5 $\frac{0}{10}$ Katigen Indigo R extra [3]

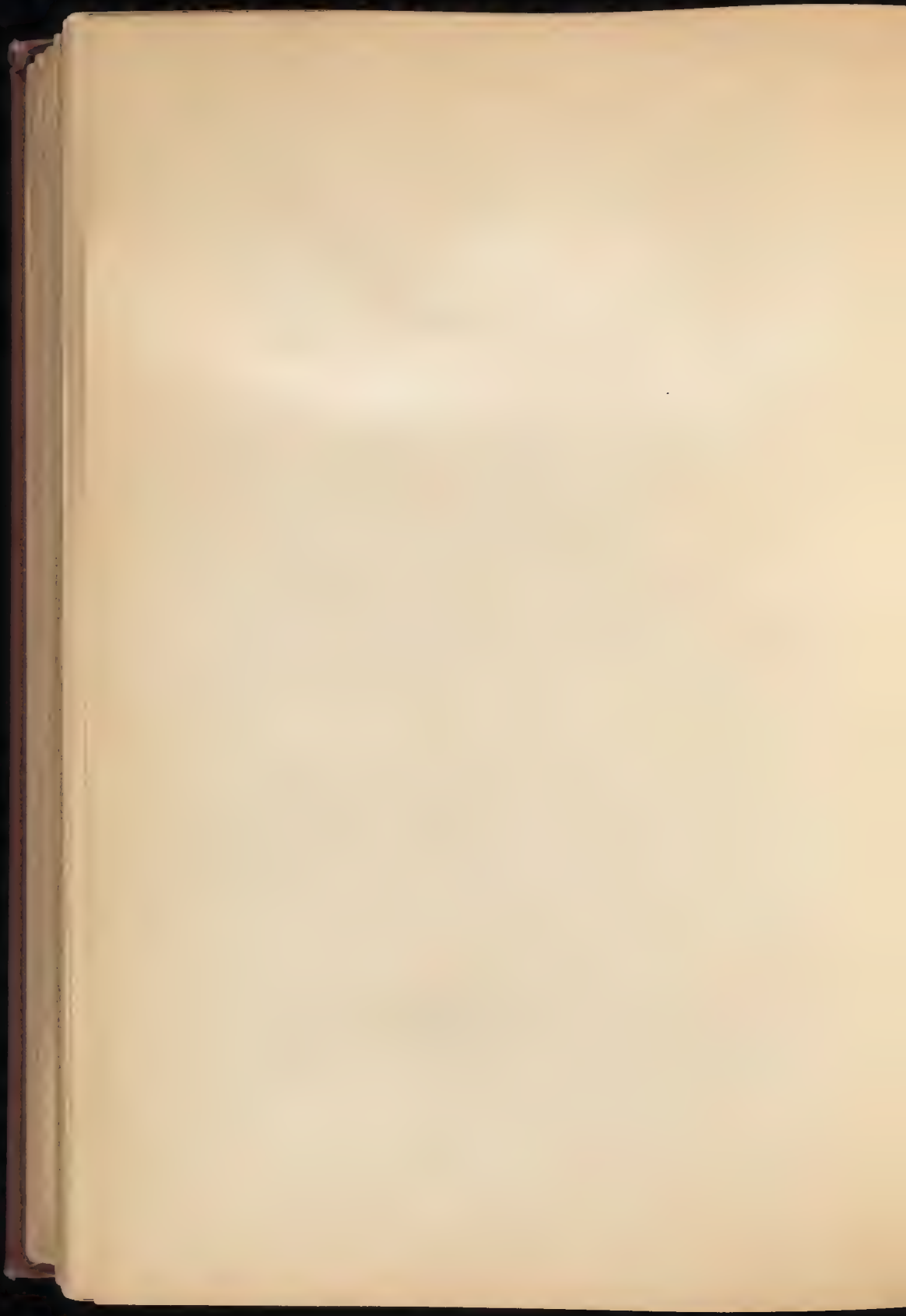
2 $\frac{0}{10}$ bichrome
3 $\frac{0}{10}$ copper sulphate
5 $\frac{0}{10}$ acetic acid</p> |
| <p>235. 15 $\frac{0}{10}$ Katigen Blue Black B [9]
(dyed direct)</p> | <p>236. 12 $\frac{0}{10}$ Katigen Black SW [7.2]

2 $\frac{0}{10}$ bichrome
3 $\frac{0}{10}$ copper sulphate
5 $\frac{0}{10}$ acetic acid</p> |

For conversion of decimal percentage into English weights and measures please refer to the table printed on the inside of the back cover.

Linen and Half-Linen.





Part IX.

Dyeing of Silk, Half-Silk and Artificial Silk.



Part IX.

The Dyeing of Silk, Half-Silk and Artificial Silk.

1. Silk Hanks.

Although the Katigen Colours have no particular affinity for the silk fibre fashionable shades of excellent fastness to light and soaping can nevertheless be obtained with them that for certain classes of goods Katigen Colours can be employed to advantage. From bulk trials it has been ascertained that when dyed at a low temperature the lustre and elasticity of the silk fibre is not affected to any great extent, even when a fairly large amount of sulphide of soda is employed. It is not absolutely necessary to dye with an addition of Glauber's or common salt, but it is advantageous to employ at least some salt; the lustre of the silk will only be affected if too large a quantity of salt be used; any other ingredients, such as soap, etc. are not necessary.

We herewith append a general recipe for dyeing:

The volume of dye liquor should be 30—40:1 of goods, and the temperature of the dye bath 100—120° Faht. Add the colour solution, which has been previously prepared by dissolving the colour and sulphide of soda in as little boiling water as possible, to the bath which should contain soft water, then enter the well wet out silk and dye in the usual way for 1 hour at the temperature stated above. When dyed rinse well and scroop with 8—10% acetic acid or 3—5% tartaric acid.

Olives: 15—30% Katigen Olive G or GN,
1—5 % sulphide of soda crystals.

Beige: 15—25% Katigen Yellow Brown GG,
1—5 % sulphide of soda crystals.

Greens: 10—20% Katigen Green 2 B,
1—5 % sulphide of soda cryst.

Light Greys: 6—25% Katigen Black SW,
5—15% sulphide of soda cryst. or half the amount calcined.

Blues: 5—15% Katigen-Indigo R extra,
2—10% sulphide of soda cryst.

Fashionable shades: 6—25⁰/₀ Katigen Black Brown N,
1—5⁰/₀ sulphide of soda cryst. or half the amount calcined.

Pearl: 6—20⁰/₀ Katigen Blue Black R,
4—15⁰/₀ sulphide of soda cryst.

etc. etc.

All these colours can of course be combined with one another, and it should be remembered that the percentages of colour stated refer to the first baths; for standing baths the quantity of colour can be reduced to about $\frac{5-6}{10}$ ths and the sulphide of soda to about $\frac{1}{2}$ of the quantity required for the first bath.

2. Artificial Silk.

The affinity of the Katigen Colours to artificial silk (Chardonnet) as well as to the artificial silk made according to the Aachen process (Glanzstoff) is the same as to the cotton fibre, and therefore the recipes given for the dyeing of the latter fibre apply on the whole to the dyeing of artificial silk, but it must be remembered that when dyeing Chardonnet silk the temperature of the dye bath should not rise above 100—120° Faht. and artificial silk according to the Aachen process must not be dyed at a higher temperature than 120—140° Faht., as when the material is wet it easily breaks at a higher temperature. The first bath should therefore contain comparatively more dyestuff and less salt so that the colour remains completely in solution at 100—120° Faht. in order to produce sufficiently deep shades.

Deep Blacks: Katigen Black TG is well adapted for the production of such shades, and we herewith append a recipe for dyeing:

Volume of dye liquor 30:1 of goods.

30⁰/₀ Katigen Black TG,
20⁰/₀ sulphide of soda cryst.
(or half the amount calcined.)
15⁰/₀ Glauber's salt, crystals
(or 7 $\frac{1}{2}$ ⁰/₀ common salt).

Dissolve the colour and sulphide of soda in boiling water and afterwards make up with cold soft water so that the temperature of the dye bath is at about 120° Faht., enter the goods and dye in the usual manner for 1 hour. Afterwards wash well and scroop with acetic acid.

The percentages of colour and ingredients should be reduced for standing baths in the same way as when dyeing cotton.

Blue Blacks: Katigen Blue Black B (if necessary after-treated with bichrome and copper sulphate).

Greens: Katigen Green 2B; in the scrooping bath the shade can be brightened with a little Brilliant Green (0.05—0.1⁰/₀).

Fashionable Browns: Katigen Black Brown N or the same in combination with a little Katigen Yellow Brown GG or Katigen Brown V extra dyed according to the following recipe:

- 12⁰/₀ Katigen Black Brown N,
- 3⁰/₀ Katigen Yellow Brown GG or Katigen Brown V extra,
- 3⁰/₀ sulphide of soda cryst.

Beige: Katigen Yellow Brown GG in combination with a little Katigen Black Brown N or Katigen Brown V extra.

The method of dyeing is exactly the same as already stated for dyeing blacks, and full particulars will be found in the chapter on the dyeing of mode and khaki shades on cotton. The excellent fastness to wearing and light of shades thus produced will be welcomed in this branch of dyeing.

The Katigen Colours have as a rule greater affinity to artificial silk made according to the Aachen process (Glanzstoff) than to the ordinary Char-donnét silk.

3. Half-Silk.

The recipes given for the dyeing of silk hanks equally apply to the dyeing of half-silk: we would recommend that the goods be wet out well before dyeing and that an addition of 5—10⁰/₀ olive oil soap be added to the bath which causes the colour to dye more easily level. For dark shades Glauber's salt can be employed, but after dyeing, the goods must be washed well and scrooped with acetic acid.

(The percentages in brackets refer to standing baths.)

237. 2.5 % Katigen Olive GN [2]
2.5 % Katigen Green 2 B [2]

238. 20 % Katigen Yellow Brown GG
[10]

239. 6.5 % Katigen Black SW [4.5]

240. 15 % Katigen Olive GN [7.5]

241. 20 % Katigen Yellow Brown GG [10]
5 % Katigen Brown V extra [2.5]

242. 15 % Katigen Indigo R extra [8]

243. 25 % Katigen Black TG [13]
0.04 % Safranin FF extra

244. 3 % Katigen Yellow Brown GG [2]
15 % Katigen Black Brown N [8.5]

For conversion of decimal percentage into English weights and measures please refer to the table printed on the inside of the back cover.

Silk.

237.



238.



239.



240.



241.



242.



243.



244.



(The percentages in brackets refer to standing baths.)

245. 25 % Katigen Blue Black 4B [15]

0.04 % Saffranine FF extra

246. 8 % Katigen Black Brown N [4.8]

247. 5 % Katigen Yellow Brown GG [4]

248. 7 % Katigen Olive GN [4.5]

2 % Katigen Green 2B [1.5]

249. 8 % Katigen Green 2B [4.8]

250. 0.75 % Katigen-Indigo B extra
[0.75]

251. 1.2 % Katigen Black SW [1.2]

252. 25 % Katigen Black TG [15]

For conversion of decimal percentage into English weights and measures please refer to the table printed on the inside of the back cover.

Artificial-Silk, (Glanzstoff).

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246.



247.

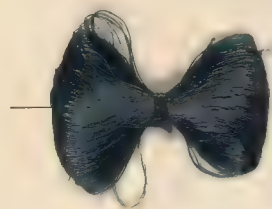


248.



Chardonnet-Silk.

249.



250.



251.



252.



(The percentages in brackets refer to standing baths.)

253. 6.15% Katigen Olive GN [9]

254. 5% Katigen Black SW [4]

255. 2% Katigen Yellow Brown GG
[1.8]

256. 5% Katigen Black Brown N [4]

257. 10% Katigen Green 2B [6]
0.03% Turquoise Blue G

258. 10% Katigen Brown V extra [6]
5% Katigen Yellow Brown GG [3]

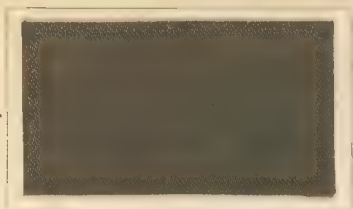
0.02% Chrysoidine G

259. 1.25% Katigen Indigo B extra [1.2]
1% Katigen Chrome Blue 5G [0.8]

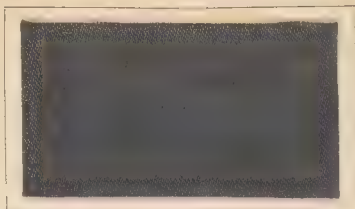
260. 30% Katigen Black SW [15]

Half-Silk.

253.



254.



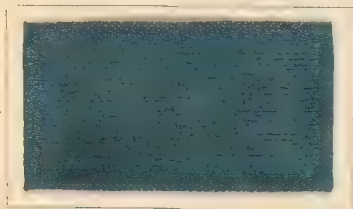
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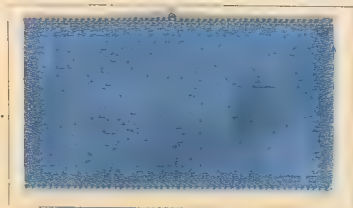
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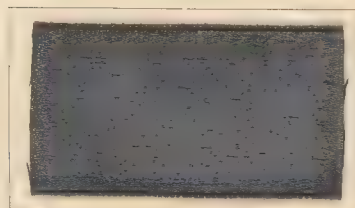
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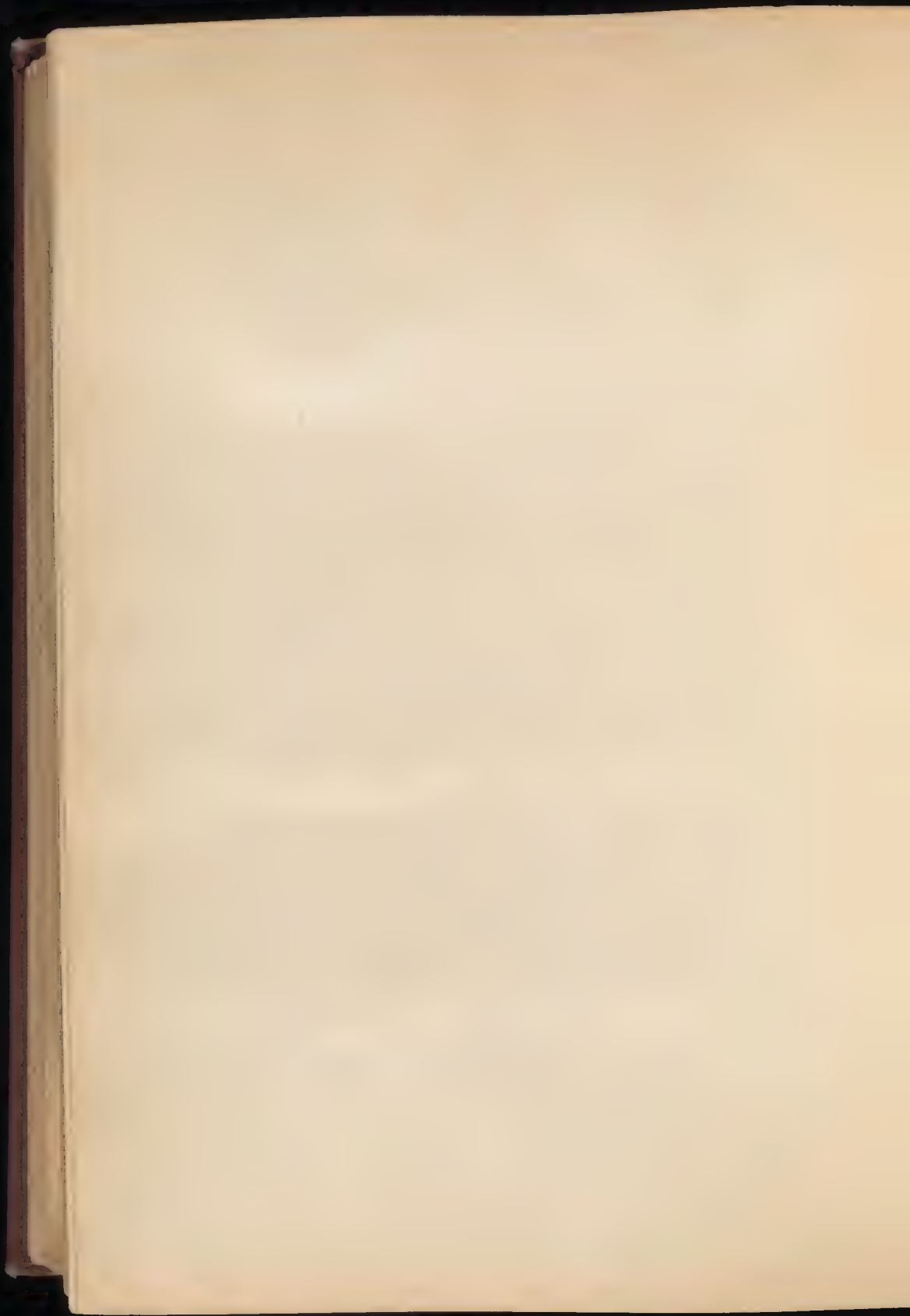


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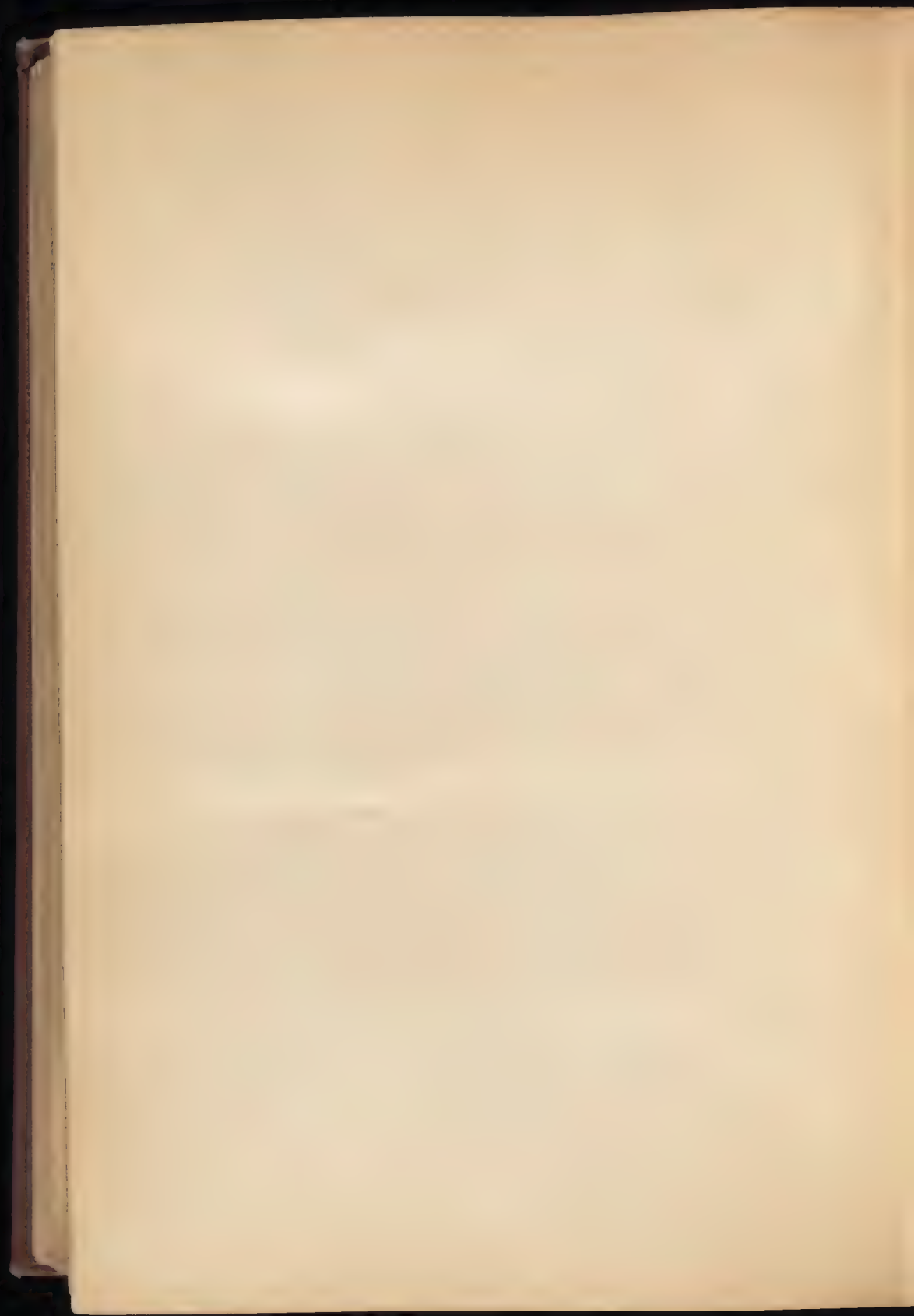
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Part X.

Dyeing of Wood, Chip-Plait,
Cocoa-Nut Fibre and Jute.



Part X.

The dyeing of Wood, Chip-plait, Cocoa-Nut Fibre and Jute.

1. Wood.

a. The staining of Wood.

Owing to the very simple method of application and excellent fastness to light of the Katigen Colours they are very well adapted for dyeing and staining art shades on all kinds of wood. Dissolve the colour with the addition of a little sulphide of soda in hot water, and before applying the colour with a brush or piece of rag see that the surface of the wood is clean and that it has been well wet out beforehand. In order to produce very level shades it is advisable to take at the most 1 oz. of colour per quart of liquor and to brush on several times.

b. The dyeing of Wood.

Dissolve the colour with a slight addition of sulphide of soda or soda in boiling water, then immerse the goods for 20 mins. in the solution and rinse first with water and afterwards with diluted acetic acid.

The following Katigen Colours or combinations have hitherto been approved of for the staining of wood.

Katigen Green 2B: $3\frac{1}{2}$ oz. colour per gallon liquor, $\frac{1}{3}$ oz. sulphide of soda crystals.

By brushing on 3 times it is quite sufficient to produce a bright green tone.

Katigen Olive GN: Application same as for Katigen Green 2B.

Katigen Black Brown N: 8 oz. colour per gallon liquor and $\frac{1}{3}$ oz. of sulphide of soda crystals, produce a reddish brown tone (Havannah).

Katigen Yellow Brown GG: $3\frac{1}{2}$ oz. colour per gallon liquor and $\frac{1}{3}$ oz. sulphide of soda, produce a yellowish brown shade.

A good moss green shade can be obtained with: 1 part Katigen Green 2B, 2 parts Katigen Olive GN.

Katigen Black SW: by varying the percentage of colour a range of shades from grey to black can be obtained with this colour. The quantity of sulphide of soda should be about $\frac{3}{4}$ of the weight of colour employed.

Katigen Blue Black R: this colour is suited for the dyeing of pearl shades: the quantity of sulphide of soda should be $\frac{3}{4}$ of the weight of colour employed.

2. Chip-Plait.

The method of dyeing is simplicity itself. Dissolve the colour and the sulphide of soda together in hot water, add this solution to the cold dye bath (containing soft water); dye either cold or at a temperature of 100—120° Faht. When the desired tone has been obtained rinse thoroughly and acidulate with dilute acetic acid, in which bath the brightening or topping with Basic Colours can simultaneously be carried out. The shades thus obtained are extraordinary fast to light, especially light fashionable shades being much faster than can be obtained in any other way.

For Deep Blacks we recommend Katigen Black TG, 8 oz. colour and 5 oz. sulphide of soda cryst. per gallon liquor. The colour of course is only partly exhausted, and for further lots add about 8% colour and 4% sulphide of soda cryst. of the weight of the goods to be dyed.

For Blue Blacks: dye with Katigen Blue Black 4B in the same way as above described; after washing treat for 20 mins. at 140—160° Faht. in a bath containing:

$\frac{1}{6}$ oz. bichrome	} per gallon liquor
$\frac{1}{3}$ oz. copper sulphate	
$\frac{1}{2}$ oz. acetic acid	

and then wash again.

Greens: Katigen Green 2B.

Olives: Katigen Olive GN.

Silver Greys: Katigen Blue Black R.

Bufs: Katigen Yellow Brown GG or this colour dyed in combination with Katigen Black Brown N or Katigen Brown V extra.

Light Blues: Katigen Indigo B extra or R extra.

3. Cocoa-Nut Fibre.

This class of material is often dyed in light shades, which must be fast to light and water, and the Katigen Colours are suited for the dyeing of such shades. The method of dyeing is exactly the same as described for chip-plait.

4. Jute.

For the dyeing of this fibre the recipes for cotton dyeing hold good, with the exception that no soda is required in dyeing, and in accordance with the character and peculiar property of the jute dye at a low temperature (See page 115, paragraph on "Dyeing Cold").

For this branch of dyeing, light shades fast to light and water are of principal interest (such as light greens, yellowish browns, browns, light blues, in fact all kinds of art shades).

Patterns of dyed Wood, Paper, Cocoa-Nut
Fibre and Jute.

(The percentages in brackets refer to standing baths.)

261. 3 $\frac{0}{10}$ Katigen Green 2B [3]
 20 $\frac{0}{10}$ Glauber's salt cryst.
 0.5 $\frac{0}{10}$ sulphide of soda cryst.

262. 3 $\frac{0}{10}$ Katigen YellowBrown GG [3]
 20 $\frac{0}{10}$ Glauber's salt cryst.

263. 2 $\frac{0}{10}$ Katigen Yellow Brown GG
 1 $\frac{0}{10}$ Katigen Black Brown N
 5 $\frac{0}{10}$ sulphate of alumina
 5 $\frac{0}{10}$ resin soap

264. 2 $\frac{0}{10}$ Katigen Black SW
 5 $\frac{0}{10}$ sulphate of alumina
 5 $\frac{0}{10}$ resin soap

265. 3 $\frac{0}{10}$ Katigen Green 2B [2]
 2 $\frac{0}{10}$ soda ash
 1 $\frac{0}{10}$ sulphide of soda cryst.

266. 3 $\frac{0}{10}$ Katigen YellowBrown GG [2]
 1 $\frac{0}{10}$ Katigen Black Brown N [0.8]
 2 $\frac{0}{10}$ soda ash.
 1 $\frac{0}{10}$ sulphide of soda cryst.

267. 4 $\frac{0}{10}$ Katigen Yellow Brown GG
 2 $\frac{0}{10}$ soda ash [2.5]

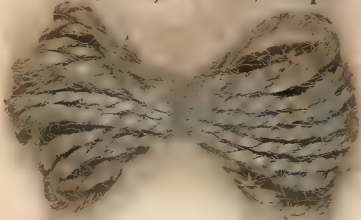
268. 2 $\frac{0}{10}$ Katigen Black 2B [1.5]
 2 $\frac{0}{10}$ soda ash
 2 $\frac{0}{10}$ sulphide of soda cryst.

269. 2 $\frac{0}{10}$ Katigen Olive GN [1.5]
 10 $\frac{0}{10}$ Glauber's salt cryst.
 1 $\frac{0}{10}$ sulphide of soda cryst.

270. 2 $\frac{0}{10}$ Katigen Green 2B [1.3]
 20 $\frac{0}{10}$ Glauber's salt cryst.
 1 $\frac{0}{10}$ sulphide of soda cryst.

Jute, Wood, Paper and Cocoa-Nut Fibre.

261.



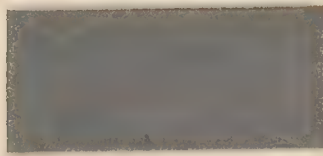
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263.



264.



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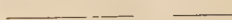
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269.



270.



Part XI.

Application of Katigen Colours in Calico
Printing.



Part XI.

The application of Katigen Colours in Calico Printing.

A. Direct Printing.

The Katigen Colours have been adopted in almost every branch of cotton dyeing, and owing to their simplicity of application and general excellent fastness have already been extensively employed, as will be seen from the foregoing chapters in this book. It is therefore very striking, that sulphide colours have hitherto not been used to any extent in printing, despite the fact that as a rule in this branch of trade much importance is attached to fast products that can be easily applied to the fibre.

The explanation for this is, that in the course of manufacture of most sulphide colours an addition of sulphide of soda is made to the product, and this can afterwards only be removed by a very complicated process. Apart from this, sulphide colours are also fixed better with the addition of sulphide of soda, and therefore both these inconveniences debar the use of copper rollers in printing, as copper is easily affected by sulphide of soda.

A property of all sulphide colours is, that they can be easily reduced by an alkaline reducing agent, which is often applied in dyeing. This characteristic can also be made use of for printing purposes, for which the Farbenfabriken have obtained a French patent, which consists of removing the addition of sulphide of soda after or during the reducing in the print paste.

According to this process, in preparing the printing pastes the colour is reduced with glucose and caustic soda or carbonate of soda in an aqueous solution, then thickened and finally freed from the sulphide by adding a salt of a heavy metal, such as copper sulphate or pyrolignite of iron; or the reduction is carried out with zinc powder and caustic soda, whereby the sulphide of soda is removed by the superfluous amount of zinc powder. When printed, steam for 1 hour at not too high a pressure, wash, and if necessary after-treat according to one of the suitable methods with metallic salt, and then soap.

Very fine blacks can be obtained when working according to the above process, but unfortunately it is scarcely possible to thicken strong alkaline print pastes in such a manner that the colour does not bleed on to the white when steamed for a long time.

All methods of printing such purified sulphide colours with or without strong alkalies are unreliable and as a rule only apply to particular dyestuffs. Apart from this the quantity of colour required is comparatively large for the depth of shade. In our opinion it seems to be essential that strong alkalies or sulphide of soda should be employed, just as in dyeing, for the printing of calico.

We have consequently applied for a patent for a method of printing sulphide colours by means of nickel-plated copper-rollers. By employing sulphide of soda the colour is fixed extremely well and the shade is very bright; the nickel layer on the copper roller is not in the slightest affected by the sulphide of soda. If the copper or brass rollers are thoroughly cleaned before nickel plating the layer of nickel is considerably harder than copper and adheres to the roller very well indeed.

The preparing of the colour paste is very simple; for a deep black for instance,

Boil:

12 ⁰ / ₁₀₀	Katigen Blue Black R
9 ⁰ / ₁₀₀	sulphide of soda cryst.
3 ⁰ / ₁₀₀	soda ash
16 ⁰ / ₁₀₀	water, and then stir in
60 ⁰ / ₁₀₀	neutral starch tragacanth thickening, British
	gum or mucilage of tragacanth.
100 ⁰ / ₁₀₀	

When printed and dried steam for 1 hour without pressure (the duration of steaming can be considerably shortened), wash, and if necessary after-treat with bichrome and acetic acid or bichrome, copper sulphate and acetic acid, wash and soap well for say about 10 mins. at 140° Faht. whereby the shades become considerably brighter in tone.

The after-treatment with metallic salts can in most cases be avoided, as most Katigen Colours when printed direct are possessed of excellent fastness. When after-treating however, it is advisable to employ a large amount of acetic acid (say $\frac{1}{2}$ - $\frac{3}{4}$ noggin acetic acid 9° Tw. per 1 gallon) so that the white remains unstained.

As can be seen from the following patterns all Katigen Colours are equally well adapted for printing according to the above process.

As the Katigen Colours are fast, even to boiling soap, they can be employed in place of Aniline Black for printed objects for subsequent top-dyeing with Benzidines. In this class of work the slightly increased cost incurred by the nickel plating of the rollers is fully compensated by the greater security in working (the goods not being liable to tender or the shade liable to turn greenish) and dispensing with ageing.

Katigen Colours worked according to the new process are also adapted for yarn printing, and their excellent fastness to washing and light as well as their simplicity of working come into consideration for this class of work.

Medium Blues on Cotton Yarns:

Boil up:

5 ⁰ / ₁₀	Katigen Indigo B extra
9 ⁰ / ₁₀	sulphide of soda crystals
3 ⁰ / ₁₀	soda ash
58 ⁰ / ₁₀	water and then stir in
25 ⁰ / ₁₀	neutral thickening (starch tragacanth, British gum solution or mucilage of tragacanth).
100 parts	

It is best to employ in the above instance brass, wooden or vulcanite rollers. The process of working is exactly the same for yarn as for pieces.

B. Discharge Printing.

For the discharging of shades dyed with Katigen Colours it is necessary to employ very strong oxidising agents, and there is then the possibility of the discharged objects becoming tendered owing to the formation of oxy-cellulose.

White Discharge FN.

Boil up:

1 ³ / ₄ pints	or 400 grms.	Arabic gum solution 1:1 and
1 ¹ / ₄ lbs.	" 200 "	chlorate of soda, when luke warm add
14 ¹ / ₂ oz.	" 145 "	powdered tartaric acid and when cooled down then add
8 ¹ / ₂ oz.	" 85 "	sodium ferrocyanide dissolved in
3 ¹ / ₂ noggins	" 170 "	water.

Print this solution on the pieces previously dyed with Katigen Colours, steam 20 mins., wash and then run through a warm bath containing caustic soda or soap.

These directions also apply, although perhaps to a more limited extent, to colour discharging, and any suitable colour such as Direct Yellow R, Chloramine Yellow, Chloramine Orange, etc. can be added to the printing paste for colour discharging.

White Discharge CF (Patented).

Stir up:

3 $\frac{1}{8}$ lbs.	or	200 grms.	British gum
$\frac{3}{4}$ pint	"	60 "	water
5 $\frac{3}{4}$ pints	"	560 "	chlorate of alumina 42° Tw.
2 lbs. 6 oz.	"	150 "	chlorate of soda
5 oz.	"	20 "	powdered red prussiate of potash
2 $\frac{1}{2}$ oz.	"	10 "	perchloride of iron (powder).
<hr/>			
1000 grms.			

The printed cloth is steamed for a short time, say 1—3 minutes, then soaped for 5—10 minutes at 140° F., rinsed and dried.

C. Slop-Padding.

Katigen Colours can be padded in the ordinary padding machine, but care should be taken to avoid employing a machine with copper fittings that come into contact with the padding solution. It is best to employ wooden or India-rubber squeezing rollers and the colour-box should be of wood or iron.

The boiled off pieces should have as long a run as possible through the solution, pass through squeezing rollers, and according to the depth of shade required and the concentration of the colour solution repeat this operation several times. Then rinse and soap at once, etc. or run through the Mather & Platt first. Should the shade turn out bronzy this defect can be obviated by rinsing in water containing some sulphide of soda.

For Blacks the following recipe can be employed for

Padding:

Boil:

about 17 oz.	or	85 grms.	Katigen Black TG and
1 lb.	"	80 "	sulphide of soda cryst. in
1 gallon	"	795 "	water until the dyestuff is thor-
			oughly dissolved, then add
$\frac{3}{4}$ lb.	"	60 "	Glauber's salt cryst. (or half the
			amount common salt) and
2 oz.	"	10 "	soda ash.

Patterns of Printed,
Discharged- and Cross-Dyed Styles.

271. 12 $\frac{0}{10}$ Katigen Blue Black 4 B
9 $\frac{0}{10}$ sulphide of soda crystals
3 $\frac{0}{10}$ soda ash
after-treated with bichrome, copper
sulphate and acetic acid

272. 12 $\frac{0}{10}$ Katigen Black 2 B
9 $\frac{0}{10}$ sulphide of soda crystals
3 $\frac{0}{10}$ soda ash
(dyed direct)

273. 8 $\frac{0}{10}$ Katigen Green 2 B
9 $\frac{0}{10}$ sulphide of soda crystals
3 $\frac{0}{10}$ soda ash
(dyed direct)

274. 7 $\frac{0}{10}$ Katigen Brown V extra
10 $\frac{0}{10}$ sulphide of soda crystals
3 $\frac{0}{10}$ soda ash
(dyed direct)

275. 5 $\frac{0}{10}$ Katigen Indigo B extra
9 $\frac{0}{10}$ sulphide of soda crystals
3 $\frac{0}{10}$ soda ash
after-treated with bichrome, copper
sulphate and acetic acid

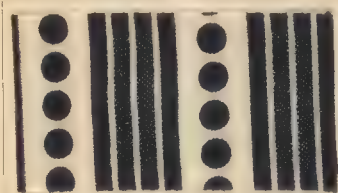
276. 2 $\frac{0}{10}$ Katigen Indigo B extra
3.6 $\frac{0}{10}$ sulphide of soda crystals
1.2 $\frac{0}{10}$ soda ash
after-treated with bichrome, copper
sulphate and acetic acid

277. 8 $\frac{0}{10}$ Katigen Yellow Brown GG
9 $\frac{0}{10}$ sulphide of soda crystals
3 $\frac{0}{10}$ soda ash
(dyed direct)

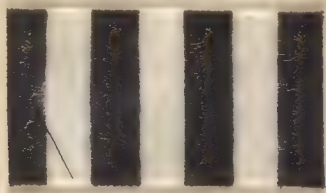
278. 8 $\frac{0}{10}$ Katigen Olive GN
6 $\frac{0}{10}$ sulphide of soda crystals
3 $\frac{0}{10}$ soda ash
(dyed direct)

Cotton-Prints.

271.



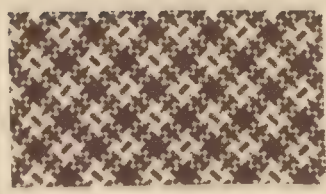
272.



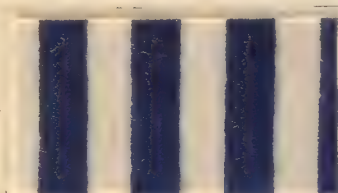
273.



274.



275.



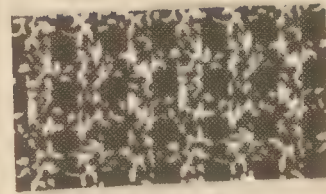
276.



277.



278.



279. 2.5 $\frac{0}{0}$ Katigen Indigo B extra
 2 $\frac{0}{0}$ Katigen Blue Black 4 B
 8 $\frac{0}{0}$ sulphide of soda crystals
 3 $\frac{0}{0}$ soda ash
 after-treated with bichrome,
 copper sulphate and acetic acid

280. 0.84 $\frac{0}{0}$ Katigen Indigo B extra
 0.66 $\frac{0}{0}$ Katigen Black TG
 2.7 $\frac{0}{0}$ sulphide of soda crystals
 1 $\frac{0}{0}$ soda ash
 after-treated with bichrome,
 copper sulphate and acetic acid

281. 1.3 $\frac{0}{0}$ Katigen Indigo B extra
 5 $\frac{0}{0}$ Katigen Chrome Brown 5 G
 8 $\frac{0}{0}$ sulphide of soda crystals
 3 $\frac{0}{0}$ soda ash
 after-treated with bichrome,
 copper sulphate and acetic acid

282. 2.5 $\frac{0}{0}$ Katigen Indigo B extra
 2 $\frac{0}{0}$ Katigen Green 2 B
 8 $\frac{0}{0}$ sulphide of soda crystals
 3 $\frac{0}{0}$ soda ash
 (dyed direct)

For conversion of decimal percentage into English weights and measures please refer to the table printed on the inside of the back cover.

Cotton Prints.

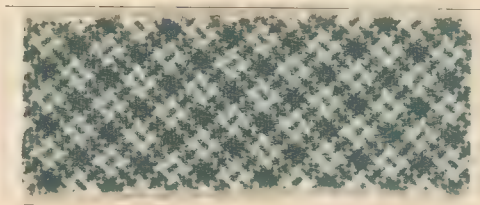
279.



280.



281.



282.



283. 12% Katigen Black 2B
9% sulphide of soda crystals
3% soda ash
after-treated with bichrome, copper
sulphate and acetic acid

284. 3% Katigen Indigo B extra
6% sulphide of soda crystals
3% soda ash
after-treated with bichrome, copper
sulphate and acetic acid

285. Dyed direct with:
20% Katigen Black SW.
Discharged with:
White Discharge FN

286. Dyed direct with:
10.5% Katigen Indigo B
after-treated with bichrome, copper
sulphate and acetic acid
Discharged with:
White Discharge CF reduced by $\frac{1}{2}$

287. Printed with:
12% Katigen Blue Black 4B
after-treated with bichrome, copper
sulphate and acetic acid
Cross-dyed with:
1% Brilliant Rhoduline Red B.
(Tannic acid tartar emetic mordant)

288. Printed with:
12% Katigen Black 2B
Cross-dyed with:
3% Benzo Purpurine 4B

289. Printed with:
13% Katigen Black TG
(direct)
Slop-padded with:
Benzo Red 10B

Yarn Prints.

283.

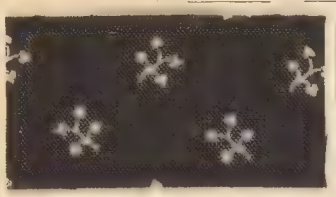


284.

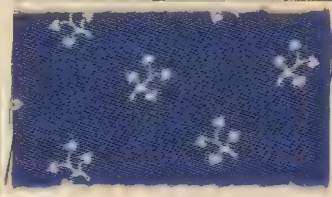


Discharge Prints.

285.

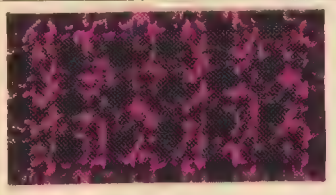


286.



Cross-Dyed Styles.

287.



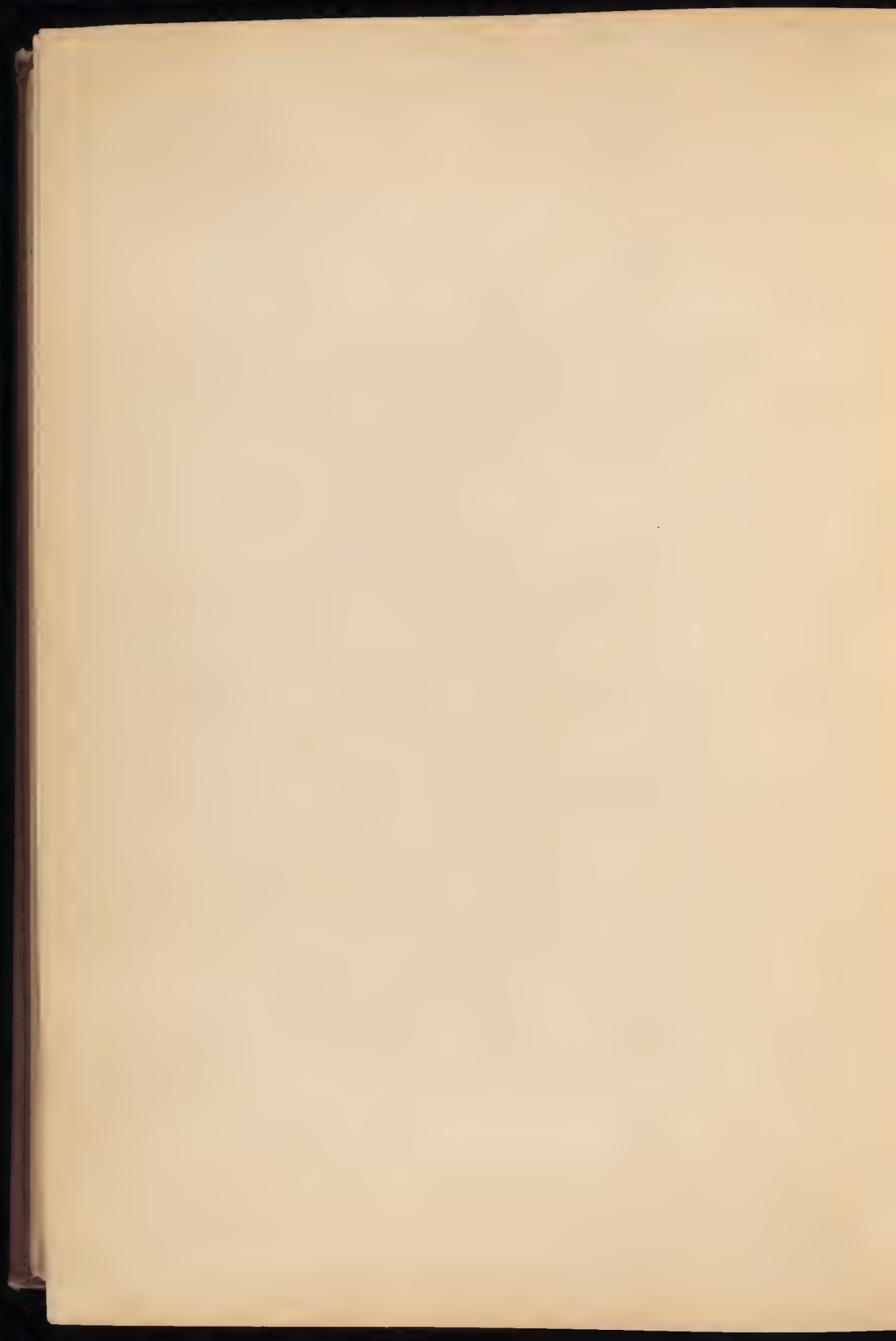
288.



289.



Supplement.



Supplement.

Whilst the MSS. were still in the printers' hands the following two improvements in the application of Katigen Colours have proved of practical service:

I. The preparing of Ordinary Baths for Katigen Colours.

According to the percentages hitherto stated it was necessary in dyeing dark shades to alter the percentages of colour and ingredients on a graduated scale for 2nd, 3rd and 4th baths and that the percentages then hold good for subsequent or standing baths. From numerous experiments made it has been ascertained that this can be obviated, at the same time obtaining a more satisfactory preparation of the bath and greater reliability for standing baths when working as follows:

a) Katigen Black on Yarns (dyed in the open vessel).

Volume of dye liquor 20:1 of goods	1st Bath	2nd and standing baths
Colour	20 $\frac{0}{10}$	11 $\frac{1}{2}$ $\frac{0}{10}$
sulphide of soda cryst. (or half the amount calcined)	40 $\frac{0}{10}$	8 $\frac{0}{10}$
soda ash	12 $\frac{0}{10}$	1 $\frac{0}{10}$
Glauber's salt cryst. (or half the amount common salt)	80 $\frac{0}{10}$	0

The recipe for dyeing in machines or in the jig is as follows:

Volume of dye liquor 7:1 of goods	1st Bath	2nd and standing baths
Colour	20 $\frac{0}{10}$	11 $\frac{1}{2}$ $\frac{0}{10}$
sulphide of soda cryst. (or half the amount calcined)	36 $\frac{0}{10}$	7 $\frac{0}{10}$
soda ash	12 $\frac{0}{10}$	1 $\frac{0}{10}$
Glauber's salt cryst. (or half the amount common salt)	25 $\frac{0}{10}$	0
Turkey red oil	4 $\frac{0}{10}$	$\frac{1}{2}$ $\frac{0}{10}$

For the first bath therefore the percentage of sulphide of soda and salt is increased and for subsequent baths the percentage of colour can be reduced from 20 to 11 $\frac{1}{2}$ $\frac{0}{10}$ without any addition of salt being necessary.

According to the above recipes any directions for dyeing black can be altered.

**b) Katigen Indigo B extra,
R extra, Katigen Chrome Blue 2 R and 5 G.**

As already stated in the recipes given the second bath for these colours holds good for standing baths: when dyeing in machines, as already mentioned under the respective chapters, no addition of salt is required.

**c) Katigen Black Brown N, Katigen Brown V extra,
Katigen Yellow Brown GG.**

For these colours, which for dark shades require a larger amount of salt, the ordinary first bath should be prepared as follows:

Volume of dye liquor 20:1 of goods	1st Bath	2nd and standing baths
Colour	20 $\frac{0}{10}$	12 $\frac{0}{10}$
sulphide of soda cryst. (or half the amount calcined)	5 $\frac{0}{10}$	$\frac{1}{2}$ $\frac{0}{10}$
soda ash	10 $\frac{0}{10}$	1 $\frac{0}{10}$
Glauber's salt cryst. (or half the amount common salt)	80 $\frac{0}{10}$	0

II. The Dyeing of Silk and Half-Silk.

As the directions already given for the dyeing of silk are only applicable for the production of light shades, owing to the affinity of Katigen Colours to this fibre not being so very great, we have still to add, that according to a process for which we have applied for a patent very fine Blacks, Dark Navy Blues and Indigo shades, in fact any dark shade, can be obtained, when working in the following manner:

a) Silk: Dissolve the colour with about half the amount of sodium hydrosulphide and dye at 100—120° Faht. with the addition of Glauber's salt (see recipe I).

Instead of employing ready prepared hydrosulphide it is advantageous (especially for blacks) to dye with sulphide of soda and bisulphate of soda (see recipe II).

- Blacks: I. 25 % Katigen Black TG
 12½ % sodium hydrosulphide
 40 % Glauber's salt, cryst. (20 % common salt).
 II. 25 % Katigen Black TG
 16 % sulphide of soda cryst.
 12½ % bisulphate of soda.

b) The remarks above under a) as a rule equally apply for half silk, with the exception that it is better to dye at the boil.

→ Without guarantee ←

Quantities of color

given are for
100 lbs. of goods.

Conversion of percentages into oz. and fractional
parts of an oz

Percentage	oz.	Percentage	oz.	Percentage	oz.	Percentage	oz.
0.001 %	$\frac{1}{60}$ th.	0.13 %	$2 \frac{1}{12}$	0.43 %	$6 \frac{7}{8}$	0.73 %	$11 \frac{11}{16}$
0.002 %	$\frac{1}{80}$ "	0.14 %	$2 \frac{1}{4}$	0.44 %	$7 \frac{1}{20}$	0.74 %	$11 \frac{3}{8}$
0.003 %	$\frac{1}{20}$ "	0.15 %	$2 \frac{2}{5}$	0.45 %	$7 \frac{1}{5}$	0.75 %	12
0.004 %	$\frac{1}{15}$ "	0.16 %	$2 \frac{4}{7}$	0.46 %	$7 \frac{5}{14}$	0.76 %	$12 \frac{1}{6}$
0.005 %	$\frac{1}{12}$ "	0.17 %	$2 \frac{5}{7}$	0.47 %	$7 \frac{1}{2}$	0.77 %	$12 \frac{1}{3}$
0.006 %	$\frac{1}{10}$ "	0.18 %	$2 \frac{7}{8}$	0.48 %	$7 \frac{11}{16}$	0.78 %	$12 \frac{1}{2}$
0.007 %	$\frac{1}{8}$ "	0.19 %	$3 \frac{1}{20}$	0.49 %	$7 \frac{5}{6}$	0.79 %	$12 \frac{9}{14}$
0.008 %	$\frac{1}{8}$ "	0.20 %	$3 \frac{1}{5}$	0.50 %	8	0.80 %	$12 \frac{4}{5}$
0.009 %	$\frac{1}{7}$ "	0.21 %	$3 \frac{5}{14}$	0.51 %	$8 \frac{1}{6}$	0.81 %	13
0.010 %	$\frac{1}{6}$ "	0.22 %	$3 \frac{1}{2}$	0.52 %	$8 \frac{1}{3}$	0.82 %	$13 \frac{1}{8}$
0.015 %	$\frac{1}{5}$ "	0.23 %	$3 \frac{11}{16}$	0.53 %	$8 \frac{1}{2}$	0.83 %	$13 \frac{3}{7}$
0.02 %	$\frac{1}{4}$ "	0.24 %	$3 \frac{5}{8}$	0.54 %	$8 \frac{9}{14}$	0.84 %	$13 \frac{1}{2}$
0.025 %	$\frac{1}{8}$ rd.	0.25 %	4	0.55 %	$8 \frac{13}{16}$	0.85 %	$13 \frac{3}{5}$
0.03 %	$\frac{1}{2}$	0.26 %	$4 \frac{1}{6}$	0.56 %	$8 \frac{15}{16}$	0.86 %	$13 \frac{3}{4}$
0.035 %	$\frac{7}{12}$ th.	0.27 %	$4 \frac{1}{3}$	0.57 %	$9 \frac{1}{8}$	0.87 %	$13 \frac{11}{12}$
0.04 %	$\frac{8}{12}$ "	0.28 %	$4 \frac{1}{2}$	0.58 %	$9 \frac{2}{7}$	0.88 %	$14 \frac{1}{12}$
0.045 %	$\frac{9}{12}$ "	0.29 %	$4 \frac{9}{14}$	0.59 %	$9 \frac{1}{2}$	0.89 %	$14 \frac{1}{4}$
0.05 %	$\frac{10}{12}$ "	0.30 %	$4 \frac{13}{16}$	0.60 %	$9 \frac{3}{5}$	0.90 %	$14 \frac{2}{5}$
0.055 %	$\frac{11}{12}$ "	0.31 %	5	0.61 %	$9 \frac{3}{4}$	0.91 %	$14 \frac{1}{2}$
0.06 %	1	0.32 %	$5 \frac{1}{8}$	0.62 %	$9 \frac{11}{12}$	0.92 %	$14 \frac{5}{7}$
0.065 %	$1 \frac{1}{16}$	0.33 %	$5 \frac{2}{7}$	0.63 %	$10 \frac{1}{12}$	0.93 %	$14 \frac{7}{8}$
0.07 %	$1 \frac{1}{8}$	0.34 %	$5 \frac{1}{2}$	0.64 %	$10 \frac{1}{4}$	0.94 %	$15 \frac{1}{20}$
0.075 %	$1 \frac{1}{12}$	0.35 %	$5 \frac{3}{5}$	0.65 %	$10 \frac{2}{5}$	0.95 %	$15 \frac{1}{5}$
0.08 %	$1 \frac{2}{7}$	0.36 %	$5 \frac{3}{4}$	0.66 %	$10 \frac{1}{2}$	0.96 %	$15 \frac{5}{14}$
0.085 %	$1 \frac{5}{14}$	0.37 %	$5 \frac{11}{12}$	0.67 %	$10 \frac{5}{7}$	0.97 %	$15 \frac{1}{2}$
0.09 %	$1 \frac{7}{16}$	0.38 %	$6 \frac{1}{12}$	0.68 %	$10 \frac{7}{8}$	0.98 %	$15 \frac{11}{16}$
0.095 %	$1 \frac{1}{2}$	0.39 %	$6 \frac{1}{4}$	0.69 %	$11 \frac{1}{20}$	0.99 %	$15 \frac{5}{6}$
0.10 %	$1 \frac{3}{5}$	0.40 %	$6 \frac{2}{5}$	0.70 %	$11 \frac{1}{5}$	1 %	1 lb.
0.11 %	$1 \frac{3}{4}$	0.41 %	$6 \frac{1}{2}$	0.71 %	$11 \frac{5}{14}$		
0.12 %	$1 \frac{11}{12}$	0.42 %	$6 \frac{5}{7}$	0.72 %	$11 \frac{1}{2}$		

Comparison of English and American

Fluid Measures.

Imperial Pint	U. S. Pint	Imperial Gallon	U. S. Gallon	Imperial Gallon	U. S. Gallon
$\frac{1}{2}$	$\frac{3}{5}$	1	$1\frac{1}{5}$	$9\frac{1}{2}$	$11\frac{2}{5}$
1	$1\frac{1}{5}$	$1\frac{1}{2}$	$1\frac{4}{5}$	10	12
$1\frac{1}{2}$	$1\frac{4}{5}$	2	$2\frac{2}{5}$	$12\frac{1}{2}$	15
2	$2\frac{2}{5}$	$2\frac{1}{2}$	3	15	18
$2\frac{1}{2}$	3	3	$3\frac{3}{5}$	$17\frac{1}{2}$	21
3	$3\frac{3}{5}$	$3\frac{1}{2}$	$4\frac{1}{5}$	20	24
$3\frac{1}{2}$	$4\frac{1}{5}$	4	$4\frac{4}{5}$	$22\frac{1}{2}$	27
4	$4\frac{4}{5}$	$4\frac{1}{2}$	$5\frac{2}{5}$	25	30
$4\frac{1}{2}$	$5\frac{2}{5}$	5	6	$27\frac{1}{2}$	33
5	6	$5\frac{1}{2}$	$6\frac{3}{5}$	30	36
$5\frac{1}{2}$	$6\frac{3}{5}$	6	$7\frac{1}{5}$	40	48
6	$7\frac{1}{5}$	$6\frac{1}{2}$	$7\frac{4}{5}$	50	60
$6\frac{1}{2}$	$7\frac{4}{5}$	7	$8\frac{2}{5}$	100	120
7	$8\frac{2}{5}$	$7\frac{1}{2}$	9	125	150
$7\frac{1}{2}$	9	8	$9\frac{3}{5}$	150	180
8	$9\frac{3}{5}$	$8\frac{1}{2}$	$10\frac{1}{5}$	175	210
		9	$10\frac{4}{5}$	200	240

